

Epidemiology of Autistic Conditions in Young Children

1. Prevalence

VICTOR LOTTER

M.R.C. Social Psychiatry Research Unit,
Institute of Psychiatry, London, S.E. 5

Summary. Basing case selection on behavioural criteria, the entire 8–10 year old population of the County of Middlesex was screened to identify children with autistic behaviour. Screening was accomplished by behaviour questionnaires, completed by teachers or other supervisors, examination of case records and interviews with selected children and informants. Among 54 children who were found to show some evidence of the syndrome, two "autistic" subgroups and one "non-autistic" subgroup were defined, according to ratings on 24 behavioural items. The 35 "autistic" cases represent a prevalence rate of 4.5 per 10,000. Data for 32 of these were analyzed. Boys were more common than girls in a ratio of 2.6 to 1. The relationship between early development, type of onset and I.Q. at the survey mean age of 9 years 9 months, is discussed. The numbers of autistic children found are compared with those of children with other handicaps such as blindness. It is pointed out that sub-division according to the presence of developmental retardation is necessary for the useful comparison of reported groups, particularly with respect to estimates of prognosis.

Résumé. En choisissant les cas selon des critères de comportement, toute la population âgée de 8–10 ans dans le comté du Middlesex fut soigneusement examinée, afin d'identifier les enfants présentant un comportement, autiste. L'examen consista en questionnaires de comportement, complétés par les maîtres ou autres surveillants, l'examen des dossiers et des entretiens avec les enfants sélectionnés et les rapporteurs. Parmi les 54 enfants chez qui l'on releva quelque évidence du syndrome, 2 sous-groupes «autistes» et un sous-groupe «non-autiste» furent définis, d'après les résultats de 24 items des tests de comportement. Les 35 cas «autistes» représentent une proportion de 4,5 pour 10 000. Les données concernant 32 de ces cas ont été analysées. Il y avait plus de garçons que de filles dans

le rapport de 2,6 pour 1. Les relations entre le développement antérieur, le genre de l'affection actuelle et le Q.I. à l'âge moyen lors de l'examen (9 ans 9 mois) sont discutées. Le nombre d'enfants autistes trouvé est comparé au nombre d'enfants présentant d'autres handicaps, comme la cécité. On souligne, en ce qui concerne le retard du développement, la nécessité de faire des subdivisions, afin de pouvoir comparer utilement les groupes étudiés, en particulier quant aux estimations pronostiques.

Zusammenfassung. Vermittels einer Fall-Suche nach Verhaltens-Kriterien wurde die Altersgruppe 8–10 Jahre der Population von Middlesex durchgegangen, um Kinder mit autistischem Verhalten festzustellen. Die Einordnung erfolgte mit Verhaltens-Fragebögen (ausgefüllt durch Lehrer oder andere Erziehungspersonen), durch Überprüfung von Fall-Geschichten und Interviews mit ausgewählten Kindern und sonstigen Informanten. Unter 54 Kindern mit Hinweisen auf ein autistisches Syndrom konnten 2 „autistische“ Untergruppen und eine „nichtautistische“ Untergruppe gebildet werden, wenn die Werte von 24 Verhaltenskriterien zugrunde gelegt wurden. Die 35 „autistischen“ Fälle ergeben eine Prävalenz-Rate von 4,5 auf 10 000. Die Daten von 32 dieser Fälle werden näher analysiert. Jungen waren häufiger betroffen als Mädchen, und zwar in einem Verhältnis von 2,6 : 1. Die Beziehung zwischen Frühentwicklung, Beginn des Syndroms und I.Q. wird diskutiert, vor allem im Blick auf das mittlere Alter der Population zur Zeit der Untersuchung: 9 Jahre, 9 Monate. Die Zahlenwerte für autistische Kinder werden mit solchen anderer Gruppen geschädigter Kinder (etwa Blindheit) verglichen. Eine Unterteilung je nach Vorhandensein eines Entwicklungsrückstandes erscheint für einen fruchtbaren Vergleich der berichteten Gruppen und für prognostische Schätzungen notwendig.

Introduction

In spite of an increasingly voluminous literature about "psychotic" disturbances in children, etiology remains obscure (KANNER, 1957), the lack of agreed behavioural criteria reflects the nosological uncertainties and prevents the useful comparison of findings (DESPERT and SHERWIN, 1958; TRAMER, 1962; RIMLAND, 1964) and prevalence is unknown (BELLAK, 1958).

Adequate behavioural descriptions are rare. The most detailed are still those made for "early infantile autism" by KANNER over 20 years ago, and in a number of papers since then (e.g. KANNER, 1943, 1946, 1951, 1954; EISENBERG and KANNER, 1956; KANNER and LESSER, 1958). In addition, detailed descriptions of certain aspects of behaviour were made by NORMAN (1954, 1955) for a group of 25 "schizophrenic" children. In 1936, EARL described in some detail the behaviour of a small group with what he called "the catatonic psychosis of idiocy", while three children with Heller's syndrome (classified as a "schizophrenic" reaction) were reported in detail by YAKOVLEV et al. (1948). Since the present survey was completed, two detailed behavioural

studies of "psychotic" children (RUTTER, 1966) and "schizophrenic" children (WOLFF and CHESSE, 1964) have been reported.

The differences between the behaviour manifested in "psychotic" children who become ill during early childhood and those whose illness is of later onset have usually been attributed to the immaturity of the former (POTTER, 1933; KANNER, 1957). However, from KANNER's study of "infantile autism" much other evidence may be derived to suggest that the disturbances in the earliest years might warrant separate investigation. In a growing number of cases he has reported a great preponderance of middle-class parents and has consistently failed to find a raised incidence of serious mental illness in the families (KANNER, 1954; KANNER and LESSER, 1958). Although KANNER has emphasized the importance of distinguishing his cases on the basis of onset and behaviour from other cases of "childhood schizophrenia", the confirmation of some of his findings in large groups of young "psychotic" children by workers who did not make this separation (CREAK and INI, 1960; RUTTER, 1964) suggests that "psychotic" disturbances in young children may be different in important respects from those occurring later. These

findings are in marked contrast to those reported by KALLMAN and ROTH (1956), whose group included only older children, and BENDER (e. g. BENDER and GRUGETT, 1956), whose groups usually included older children, although at any age her diagnoses may not be comparable with the other groups quoted (KANNER, 1958; DESPERT and SHERWIN, 1958; BRUCH, 1959).

All the groups on which the reported findings were based were, however, clinic or hospital admissions; referral bias cannot therefore be excluded as a possible explanation for some of the results (CREAK and INI, 1960; BENDER, 1959).

"Psychotic" conditions in children have traditionally been reported as rare. A few early reports suggested the numbers might be greater than had long been thought because of the confusion of some cases with "feeble-mindedness" (POTTER, 1933; DESPERT, 1938). In more recent years diagnoses have been much more readily made although with greatly varying frequency. Thus of 7,000 children aged 2 to 12 years admitted over a period of 20 years to the Bellevue Hospital in New York, 850 (12%) were given the diagnosis "prepubertal schizophrenia"; however, only 105 were under 6 years old (BENDER, 1958). KANNER (1958) reported having seen 150 cases of "infantile autism" in 19 years, i. e. about 8 cases a year, while CREAK (1963) saw 100 cases of the "schizophrenic syndrome of childhood" in about 18 years, i. e. about 6 cases a year. FONTES (1958) in Lisbon reported 4 cases of "infantile schizophrenia" in 8,300 clinic admissions. In a population survey, JAEGGI (1964) found 50 cases of "infantile psychosis" among the 50—60,000 persons under 20 years old in Geneva, a rate of between 8 and 9 per 10,000, while RUTTER (1966) discovered 4 "psychotic" children in the whole 8 to 10 year old population of Aberdeen, Scotland; a rate of 4.4 per 10,000.

Estimates of prevalence range therefore from about 4 to nearly 10 per 10,000 but the criteria used to select cases are seldom stated in such a way as to permit useful comparison. No study aimed at discovering prevalence according to stated criteria in a sufficiently large, general population has been reported.

In spite of the very considerable difficulties of definition and case finding in psychiatric disorders (REID, 1960) and in children's behaviour disturbances in particular (SHEPHERD and COOPER, 1964), epidemiological methods may produce data which indicate fruitful directions for further research (PASAMANICK, 1954), as well as providing useful administrative information (TIZARD, 1963) and permitting the examination of clinical hypotheses. A cross-sectional survey was therefore made in the County of Middlesex during 1963/64 with the main aim of estimating the age-specific prevalence of behaviourally defined "autistic conditions" in young children. In this paper the survey is described and rates of prevalence as well as certain characteristics of the identified chil-

dren are reported. The results of the analysis of further descriptive and epidemiological data will be the subject of a second report.

Method

1. *A note on terminology.* Because of the probable heterogeneity of the disorders included amongst young children classified generally as "psychotic" or "schizophrenic" (KANNER, 1957), and because an impairment in their relations with people, sometimes called "autism", appears to be the most commonly reported symptom, the adjective "autistic" was used in this study as a convenient descriptive label. It is important to note that the term was *not* intended to refer only to Kanner's syndrome of "infantile autism", and in what follows is used without qualification to refer to all children who met the behavioural criteria used to select cases. References to "autistic behaviour" are to be similarly interpreted.

2. *Definition of a case.* The most comprehensive behavioural criteria for the recognition of young autistic children are those of CREAK et al. (1961). Based mainly on the descriptions of KANNER and NORMAN, they include the principal aspects of behaviour emphasized also by other writers, such as a marked unevenness in intellectual retardation (SCHEERER et al., 1945), bizarre motility (EARL, 1936; YAKOVLEV et al., 1948), gross anxiety reactions and "clinging" social behaviour (MAHLER et al., 1949), and unusual sensory sensitivities (BERGMAN and ESCALONA, 1949). The criteria were used in a version prepared by WING (1966) which aimed to clarify the behavioural descriptions and avoid interpretation of behaviours.

The number of behaviour categories was reduced by subsuming into other categories the behaviour referred to as indicating an "unawareness of self-identity" and, in the final selection of cases, performance on tests replaced the subjective assessment of "islets of ability". Only behaviour which had been persistently present for a prolonged period was accepted, so that transient episodes and normal developmental patterns simulating the disorders were excluded. The presence of ascertained brain damage or other handicaps did not automatically exclude a case. No one aspect or combination of behaviours was considered to be of special significance, except that emphasis was placed upon the presence of behaviour indicating impaired social relationships.

The few cases expected, and the need for developmental description, determined both the choice of population and the method.

3. *The population.* Because it has a dense mainly urban population, extensive social services, a co-operative local authority, and was accessible and large enough to yield an adequate number of cases, the County of Middlesex, with a population of about 2¼ million, contiguous with the west and north boundaries of the County of London, was chosen for

the survey. In order to gain the maximum advantage from accumulated medical and school records, and to avoid case finding difficulties resulting from school transfer at 11 years, the enquiry was limited to the approximately 78,000 children born in 1953—55, and thus aged 8—10 years on the survey census date, 1. 1. 1964, whose homes were in Middlesex on the date.

4. *Case selection.* The survey population comprised two main administrative groups: normal and handicapped children. Most children ascertained handicapped according to the 10 categories defined by the Education Act 1944 (blind, partially sighted, deaf, partially deaf, educationally subnormal, epileptic, maladjusted, physically handicapped, those with speech defects, and the delicate) attended special schools, and for all of them there existed detailed case records containing medical, psychological and educational reports. For the normal school population, amongst whom it was thought there might be a few unrecognized autistic children, the only sources of information were the schoolteachers, and in some cases, child guidance clinics.

A 22-item behaviour questionnaire was therefore constructed, aimed mainly at screening the ordinary school population. The items covered speech, movements, social behaviour, and repetitive-ritualistic behaviour, and were to be marked as applying to the child definitely, somewhat or not at all.

Discussions with teachers following two pilot studies involving 910 normal school-children, 107 educationally subnormal and 20 maladjusted, in altogether 9 schools, showed that while they had submitted returns for many children without autistic symptoms, no child showing marked autistic behaviour excluded. Two independent judges examining the pilot questionnaires, according to the same criteria, to select those describing behaviour which required further examination, achieved 84.3% agreement in the first pilot, and 87.5% in the second. Of the 7 questionnaires returned for diagnosed "psychotic" children in a school for maladjusted (not in the survey area), 6 were selected by both judges. The one child not chosen no longer showed any of the listed behaviour. Language problems raised by a high proportion of foreign children (in some schools as high as 50%) were not found to present the teachers with the difficulties that had been anticipated.

The main conclusions arising from these preliminary surveys were that while teachers returned forms for all children who exhibited at all markedly the behaviour specified, over-inclusion would require careful screening of completed questionnaires; when the teachers gave detailed examples in the questionnaire of the behaviour being rated, selection of "possible" cases was easier and more reliable. In the revised form finally used the importance of detailed examples of behaviour was stressed and more space was provided for them (see appendix 1).

In the survey itself the population was screened in several stages:

a) *Stage I.* A preliminary letter was sent to every possible source of Middlesex children both within and outside the county, including private schools, asking how many aged 8—10 were under their care. The total number reported was 76,388. The revised questionnaire was then sent to all these "sources" with a letter explaining that the survey was concerned with unusual children showing "certain kinds of behaviour", and accompanied by a sheet of instructions containing a description and examples of the kinds of behaviour sought. Replies were received for 75,930, or 99% of the total reported population. Of the 458 children in "sources" which failed to cooperate after being sent the questionnaire, 457 were in ordinary schools. The number for whom returns were made thus represented 97% of the total population of 78,000, estimated from the latest (1961) national census returns. Altogether 2,154 questionnaires were completed. Most of these contained little or no evidence of abnormal behaviour apart from "backwardness" and were excluded by a minimum criterion of acceptability. The remaining 666 were submitted to the two judges familiar with the syndrome, who had participated in the earlier stages of the survey (N.O. and J.W.). Using different methods they independently agreed that 578 (87%) could be confidently excluded. Disagreed cases and those both judges agreed were "possible" were retained, a total of 88 names.

Independent screening of the local authority case records of all handicapped children aged 8—10 years by two other workers familiar with autistic children and with previous experience of case record examination according to agreed rules (A.L. and V.L.), produced 82 "possible" cases. A reliability check on a 10% sample of case records showed complete agreement between the workers as to which cases should be rated as having "strong" or "moderately strong" indications, but there was some disagreement about those who should be rated "weak", because the policy of over-including doubtful cases was differently interpreted by the two examiners. These disagreements however were slight. Thirty-five of these possible cases were already included in the list of 88 names described in the previous paragraph. The remaining 47 names were added to the list, making 135 possible cases in all.

b) *Stage II.* Each of these 135 children was seen by the investigator (V.L.), either in ordinary school, special school or junior training school, hospital or at home. An attempt was made to test each child on the Peabody Picture Vocabulary Scale (DUNN, 1959), the Séguin formboard and the Draw-a-man test (GOODENOUGH, 1926), and a detailed description of current behaviour was obtained on a standard form from an informant, usually a teacher, nurse or training school supervisor, who knew the child well. Items

of observed and reported behaviour were rated (0 — absent, 1 — present but very mildly or only intermittently; 2 — definitely present but in moderate degree; 3 — unmistakably and strongly present) in five categories: speech, social behaviour, motor peculiarities, repetitive-ritualistic behaviour, and "other". Of the 135 children interviewed, only 61 satisfied the following criteria and were therefore retained for the next stage:

a) Case records contained evidence rated "strong" or "moderately strong", whether or not the present behaviour was autistic.

b) Current behaviour was rated (3) in any of the five categories, (non-speaking children not noted during the case record examination were retained only if the behaviour rating concerned some other category than speech or social behaviour), or for whom the sum of the ratings amounted to 4 or more.

c) *Stage III.* A social and medical history and a detailed behavioural description of the development of these 61 children was then obtained from their mothers according to a standard interview guide. One interviewer (V.L.) saw all the mothers. In addition the Vineland Social Maturity Scale (DOLL, 1947) was completed for each proband, details were obtained about the mental health of the parents and siblings, and both parents were tested on the Standard Progressive Matrices and the Mill Hill Vocabulary Scale (form 1, Senior: RAVEN, 1962).

d) *Stage IV.* Finally, all available medical records were examined for details of behaviour, the results of clinical investigations, and the circumstances of the birth of both probands and siblings. Wherever possible, descriptions were obtained also from previous schools attended by the probands, and from the records and recollections of child guidance clinic staff.

e) *The selection of autistic children.* All information was then combined in a single file for each child. These files were examined in turn and 24 items of behaviour were rated: 0 — absent, 1 — present but not markedly, or 2 — markedly present. (Note: ratings of mood disturbances were not included because almost every child was reported to have or have had tantrums, and finer discrimination was difficult.)

The sums of the individual ratings constituting the total "score" for each child were then ranked. A cut-off point was chosen by inspection below the lowest scoring child who, on clinical grounds, it was thought should be included. (When "speakers" and "non-speakers" were ranked separately, the same cases were included). The 32 children with total scores above the cut-off point were called autistic (cases 1—32); those with smaller scores (non-autistic) were retained for comparison (cases 33—54). (It should be noted here that all the survey interviews, the extracts from the hospital case notes, and the

final behaviour ratings were made by the same worker.)

5. *The selection of a "nuclear" sub-group*

Amongst the autistic children a subgroup was formed of those with the highest scores in the two categories "social" and "repetitive-ritualistic" behaviour (see Table 1). The co-existence of symptoms in these two behaviour areas is characteristic of "infantile autism" but, because very similar behaviour was found in some of the survey children who became ill only after the age of 2 or 3 years, the subgrouping was made independently of the age of onset. The categories were defined as follows:

a) "Social" behaviour. Abnormality in their relationships with people is the most commonly reported characteristic of autistic children. Although described by different terms such as "autism", "withdrawal", "lack of object relations", "defect in emotional rapport", "disturbed social contact", or, as in the Creak criteria, "a gross . . . impairment in emotional relations with people", a common element is a failure to *respond* in a normal way to people. This characteristic was present in all the autistic children in the survey, at some time, in varying degrees; the kinds of behaviour by which it was recognized varied among the children according to the severity of their apparent mental subnormality, and can best be described by examples.

Children with I.Q. over 55

Amongst the children with I.Q.'s above 55 none at the time of the survey played ordinarily with other children, and most paid little or no attention to them; all had some useful speech so that a refusal to use it, or bizarre content, or visual avoidance while speaking, accentuated the peculiar quality of their relationships. In some, behaviour was appropriate in a face-to-face situation (e.g. during testing) but was markedly solitary and bizarre in the playground. A few children with good speech seemed almost "normal" at interview and for them assessment was based mainly on descriptions of earlier behaviour. Examples are:

Case 5, age 9—6, untestable, previous Terman-Merrill I.Q. 57 at age 7—0. Present social behaviour abnormal: Seen in special unit. Repeatedly filling and emptying a container with sand: violently pushed away a child who approached his activity. Reported to speak rarely, and only to his teacher; usual response to questions is "No", screamed when certain words were said by others. Will engage in rough play with adults but entirely ignores other children. Seen again, at his home, refused to enter the room, remained alone in the kitchen (for 2½ hours) playing an elaborate water game.

Case 1, age 11—3, Verbal I.Q. 101, previous Merrill-Palmer I.Q. 89 at age 7—4. Present social behaviour almost normal: Seen at his home; he met me at the door. Long sensible conversation possible. Has no friends, is "uninterested in children", never goes out alone. *Previous social behaviour:* Referred at the age of three for lack of speech; "behaving like a deaf child", ignored anyone speaking to him; at age 3½, showed "A complete lack of affect" and was "happy in his own world"; he ignored people coming into the room.

Case 17, age 9—5, Verbal I.Q. 126 (overestimate), previous Binet I.Q. 90 at age 9—5. Present behaviour almost normal: Seen at his home, greeted me, conversed sensibly at a rather immature level. Avoids other children — never goes out alone. *Previous social behaviour:* At 3, refused to be cuddled or touched or helped in dressing, "We couldn't get near him". By 5, "very aloof, a life apart", never any spontaneous affection. Refused to talk about school. At 6, a psychiatrist reported him to be "very anti-social, grossly over-dependent, emotionally fixated at an infantile level". At 6½, a psychologist

reported "he can now look me in the eye"; at school (age 7), "frightened of other children, spent his time tapping things — never joined in class activities, sometimes jumped up and shouted irrelevant commands". For years refused to allow any other children into his house.

Children with I.Q. below 55

When they were seen, most of the more severely subnormal children (I.Q. under 55) had little speech and many failed to respond to words. Only a few were intensely self-isolating, sometimes shutting themselves in cupboards or occupying themselves solitarily in corners. None had any contact with other children and some deliberately avoided them. None made spontaneous approaches to strange adults (e.g. visitors) but many seemed to enjoy physical contact with their parents or familiar adults. Those who were seen in mental subnormality hospitals could not readily be distinguished by observed or reported contemporary behaviour from some other children in the same wards so that assessment rested mainly on descriptions of their earlier behaviour. Examples are:

Case 10, age 11—0, formboard 32 secs., no previous tests. Present social behaviour abnormal: Seen in training school. He was sitting at a sand tray, facing the wall, filling and emptying a bucket, an habitual activity. He ignored several attempts to interest him in the formboard. Eventually completed the test obliquely, resolutely facing the sand tray and the wall while doing so; after each trial pushed the formboard away. He acknowledged our presence in no way, nor did he once look at us. He had no speech.

months, people asked if she was deaf, she failed to respond to their attempts to "amuse" her. (Diagnosed "mentally defective" at age 3.) Always extremely solitary; lack of speech comprehension led to her being "herded about the house like an animal". Severely disturbed behaviour led to the intervention of the police and admission to hospital.

b) "Repetitive-ritualistic" behaviour. Evidence for an "obsessive insistence on the preservation of sameness" was observed by KANNER (1943) in a wide variety of behaviours, many involving an elaborately repetitious manipulation of objects. The two categories of the Creak criteria concerning a "pathological preoccupation with particular objects" and "an insistence on the preservation of sameness" were therefore combined. The items within the combined "repetitive-ritualistic behaviour" category represented behaviour which is easily reported and recognized; detailed descriptions are therefore not presented. It should, however, be noted that Item 23 (See Table 2) refers to a resistance to certain changes in the *physical* environment (e.g. the arrangement of articles of furniture, or the wearing of certain clothes), while Item 24 refers to *activities* (e.g. the temporal ordering of events, the direction of a

Table 1. Scores allocated to the 32 autistic probands in the areas "social" and "repetitive-ritualistic" behaviour, illustrating the score criterion for the selection of Group A

GROUP A				GROUP B			
Case No.	Total score, all items	Social behav. score	Repet-rit. score	Case No.	Total score, all items	Social behav. score	Repet-rit. score
1	22	6	9	16	12	6	2
2	24	5	5	17	23	5	4
3	17	5	7	18	13	5	2
4	23	7	6	19	18	5	4
5	22	8	9	20	17	5	4
6	26	9	6	21	12	2	2
7	20	7	5	22	19	6	3
8	33	10	7	23*	13	4	3
9	28	7	6	24	11	5	1
10*	27	10	5	25*	14	7	2
11*	28	8	9	26*	12	8	2
12	24	6	6	27	15	6	0
13	25	5	6	28	15	4	2
14	22	8	6	29*	13	6	4
15*	27	8	10	30	13	5	0
				31	13	6	0
				32*	16	6	3

Maximum total score: speaking children = 48
 non-speaking = 40
 * Non-speaking children

Maximum score on social behaviour = 14
 Maximum score on repetitive-ritualistic behaviour = 10

Case 11. (Age 10—3, formboard 44 secs. — many errors. No previous tests.) Present social behaviour abnormal: In mental subnormality hospital since age 5. Refused to look at tester. Pushed tester away but enjoyed being tickled. Interested in formboard, tried to manipulate by using tester's hand as a tool. Solitary, mute. *Previous social behaviour:* He has never responded to his name; family called him by whistling. Behaved "like a deaf and dumb child"; never came to mother for comforting, has always "ignored strangers" and never took any notice of children. Began early to use mother's hand to manipulate even those things he could do himself. He has never spoken.

Case 14. (Age 10—6. Untestable, no previous tests.) Present social behaviour abnormal: In mental subnormality hospital since age 9. Would not sit down, looked at tester from a distance but turned away when spoken to. Moved aimlessly about, rocking and waving a sweet paper, occasionally masturbating. Screamed "No" to questions, otherwise paid no apparent attention to the interviewer. Can say few parrot phrases only. *Previous social behaviour:* From before age 12 months "she never looked at us" (mother). By 18

usual walk, the use of verbal formulae and similar rituals). Resistance was by screaming or temper tantrums; these reduced in frequency as the demands were understood and acceded to by parents.

Fifteen children who had high scores in both these categories were called group A (cases 1—15); they tended also to have the highest over-all scores (Table 1). Autistic children who did not show this marked combination of behaviours and who generally had fewer, less marked, and more heterogeneous symptoms, were called group B (N=17, cases 16—32). The remaining, non-autistic, handicapped children, many of whom nevertheless had some behaviour similar to the autistic children, were called group C (N=22, cases 33—54). Percentage scores were calculated for each of the 24 items and

for the category totals; these are shown separated for groups A, B, and C, in Table 2.

Table 2. Mean percentage scores on 24 behaviour items in groups A, B, and C

Item	Behaviour rated	Mean percentage scores and types of children		
		Autistic Group A (N=15)	Group B (N=17)	Non-Autistic Group C (N=22)
<i>All speech items*</i>				
	1. Speech not used for communication	54	38	12
	2. Reversal of pronouns	63	33	0
	3. Echolalia	21	12	8
	4. Repetition of phrases	67	46	25
	5. Visual avoidance	67	58	13
<i>All social behaviour items</i>				
	6. Solitary	72	53	14
	7. Ignores children	53	38	2
	8. Aloof and distant	97	70	32
	9. Walks/looks through people	87	79	15
		97	70	18
<i>All movement peculiarity items</i>				
	10. Self spinning	30	6	0
	11. Jumping	40	28	8
	12. Flapping	47	14	0
	13. Toe walking	43	44	14
	14. Other marked mannerisms	33	14	14
		13	18	9
		63	47	5
<i>All "auditory" items</i>				
	15. Behaves as if deaf	45	34	10
	16. Covers ears	67	50	5
	17. Distress at noise	47	26	11
		23	26	14
<i>All repetitive/ritualistic items</i>				
	18. Elaborate food fads	49	16	7
	19. Lines and patterns with objects	27	6	2
	20. Spinning objects	43	9	0
	21. Other elaborate ritual play	17	9	5
	22. Carrying, banging, twirling etc. objects	83	35	11
	23. Insistence on sameness (objects)	37	38	9
	24. Insistence on sameness (events)	53	9	15
		80	12	9

* Speaking children only

6. *Limitations of the material.* For 11 children, data were incomplete. Three mothers refused to be interviewed, 6 were either dead, ill, or could not be traced, or the children were illegitimate and no substitute informant was available; the parents of 1 child were abroad and returned by post a detailed behaviour questionnaire only. One child could not be seen. Because of inadequate alternative data, 7 of these 11 children were excluded from the behaviour rating. In a report of the survey made to the Middlesex County Council (LOTTER, 1966) 3 of these children were included in group B and 4 in group C, on the basis of the limited information available. In order to simplify presentation of the comparative analysis, all 7 were excluded from the group reported here. (The 3 autistic children originally included in group B are however included in the calculation of prevalence on page 130.)

7. Reliability

a) *The selection of cases.* An estimate of the reliability of the questionnaire returns, and the selection of questionnaires by the independent judges, was made by comparison with the cases selected from local authority case records. Complete agreement was not expected, since the case records contained more detailed information about the children, including their early development, whereas questionnaires were completed on the basis of present behaviour only.

1. Questionnaire returns versus case records: Of 82 cases selected from the records, questionnaires were expected for 76 (6 children were at home and no questionnaire was possible), and 58 were received; of the 18 which teachers failed to return, 4 were included as autistic on the final behaviour ratings. One of these was in a special school, having lost many of his earlier behaviour peculiarities, and 3 were in junior training schools where many of the children have peculiar behaviour and selection by the teachers was especially difficult.

2. Case records versus judges: Of the 666 children whose questionnaires were submitted to the judges, 52 were chosen also from case records, and 35 of these were included amongst the 88 questionnaires selected by the judges. Of the 17 they failed to select, only 1 was included as autistic in the final behaviour ratings.

b) *Behaviour rating.* All the interviews and the final ratings were made by the same worker (V.L.). To check the possibility of a consistent bias in the allocation of scores to the items, all the information in each case file was rated independently by a psychiatrist (J.W.). Of the 32 children rated as autistic by the interviewer, 28 were amongst the 32 given highest scores by the independent rater.

c) *Mothers' reports.* The accuracy of retrospective data derived from mothers' reports has often been questioned, and most recently by ROBBINS (1963). However several authors have shown that data which are objective, well-defined and based on questions about *whether* certain events took place rather than *when* they did, or their duration, are relatively more accurately recalled (LAPOUSE and MONK, 1958; HAGGARD et al., 1960; ROBBINS, 1963). Since most of the descriptive data in the survey were obtained retrospectively from mothers, an attempt was made to estimate their reliability. Three indices were used: birth weight, age of first walking unaided, and the presence or absence of certain behaviours.

Birth weights reported by mothers were compared with those recorded in maternity hospital case notes; age of walking reported by the mother during the survey was compared with her earlier reports to a clinic or hospital which, in most cases, were recorded not longer than 2 to 3 years after the event. The discrepancy in the mean birth weight reported by mothers ($N=28$, 114.1 ounces) was

+0.9 ounce and in the mean age of walking ($N=22$, 18.7 months), was -0.2 months. These are very similar to the discrepancies reported by ROBBINS (birth weight +0.02 ounce, age of walking -1.1 month) in reports made about children when they were only 3 years old. A lower correlation found for reports of walking-age ($r=.86$) than for birth weight ($r=.98$) was probably caused partly by the difficulty of reporting a precise age at which an emerging ability becomes established.

In order to estimate accuracy of the mothers' descriptions of behaviour, their reports on 4 behaviour items in each of 4 areas (social, motor, auditory, and repetitive-ritualistic behaviour) were compared with observations made in clinics or hospitals at various times previously. Of the autistic children with detailed hospital records, 21 were included in the comparison; 11 from social classes I and II, and 10 from classes III—V. Fifteen were boys and 6 girls. Each of the individual behaviour items noted as "present" or "absent" according to the hospital descriptions, was then compared with the mothers' reports of the same item. In 77 of the 84 items (92%) the mothers' descriptions agreed with the earlier records.

The recall of birth weights and motor milestones may not be comparable with the recall of abnormal behaviour. Nevertheless mothers are able to recall birth weights with great accuracy, and to report similarly about motor milestones at interviews widely separated in time. The high level of agreement between behaviour previously reported by mothers, or independently observed, and reports by the mothers at the survey interviews probably results partly from the early onset of behaviour which in autistic children may show similar patterns over long periods (see KANNER, 1943). Anxiety about their children's development, frequent medical consultations requiring rehearsal of the symptoms, and the strangeness of much of the behaviour may all have contributed to the accuracy of the mothers' descriptions of behaviour for the autistic children in the survey. None of the comparisons described above revealed marked differences in the accuracy of recall between mothers from different social classes.

Results

1. *Prevalence.* Including the 3 autistic children for whom only incomplete data could be obtained, the total of 35 children represents a rate of 4.5 per 10,000 at age 8—10 in the County of Middlesex. Fifteen of these (2.0 per 10,000) had the marked symptom-combination defining group A. If only the 32 children included in the behaviour analysis are considered, the over-all rate is 4.1 per 10,000, with 2.0 per 10,000 defined as group A.

2. *Age and Sex.* The mean age of the 32 autistic children on the survey census date 1. 1. 1964 was

9.5 years. The mean age for sub-group A was 1 month less than the mean for the other two groups.

There was an excess of boys in all three groups. The largest excess occurred in group A (11 boys, 4 girls, a ratio of 2.75 : 1), the next in group B (12 boys, 5 girls, = 2.40 : 1), and the smallest in the non-autistic handicapped group C (13 boys, 9 girls, = 1.44 : 1). All the autistic children above I.Q. 55 were boys; amongst the low I. Q. autistic children therefore the boy/girl ratio was no higher than amongst the non-autistic children.

3. *Onset.* The autistic probands were classified according to the type and age of onset. Ten (4 of them in Group A) had an onset involving a "set-back"* in development, while 22 (11 in Group A) had a gradual onset without evident loss of abilities, or were always backward. Of these 22, 17 had some retardation in motor milestones and 18 said their first words late or have never spoken.

For most of the children with a setback, there was little difficulty in establishing the age of the child when the changes in behaviour were taking place since they were usually severe. Of 3 children with a setback between age 18—27 months, 2 became mute by about 24 months, and one was referred to specialists at 27 months because of a failure in speech development and odd behaviour following a promising early development. In a further 7 children, the setback occurred after 27 months: in 4 before age 3 years, and in 3 between 3—4½ years. In 3 of these later onset children, setback was severe and fairly rapid.

Attempts to establish an age of onset in retrospect for autistic children without a setback are difficult and probably unreliable; most of them, however, were more or less retarded in development and in this sense were "abnormal" from an early age. Often early peculiar behaviour was attributed by parents to slowness in learning to speak. All these 22 children were recognised as retarded or peculiar by age 3 years, and 7 had some autistic behaviour by 27 months.

4. *Intelligence.* Only a single attempt to obtain a test result for each child was possible in the survey. Where a satisfactory estimate could not be obtained the results of other tests made after age 5 were used. Four of the 32 autistic children refused all the survey tests and had not been successfully tested before; all four were in mental subnormality hospitals or homes, and there was no evidence to suggest they were not severely subnormal.

Altogether about two-thirds of the autistic children were functioning at a severely subnormal level, i.e. with I.Q.'s below 55 (Table 3). Where a score

* By "setback" was meant either a) the loss of some ability, for example, speech, or b) the failure to progress after a satisfactory beginning. A child had a "satisfactory beginning" if he learned to sit unsupported by 10 months, walked unaided by 17 months, and said his first intelligible word by 16 months.

slightly above I.Q. 55 was achieved on the Séguin formboard only, a few children were classified as "below I.Q. 55" on the basis of a consistently lower performance in all other tests. Eight of the 10 children with I.Q.'s above 55 were classified according to their scores on the vocabulary test; one other child had a verbal I.Q. of 53, but 80 on the Séguin, 87 on the Draw-a-man, and at age 6 had a Binet I.Q. of 69, while the other, untestable at the survey, had a Binet I.Q. of 57 at age 7.

Table 3. Frequency and percentage distribution of I.Q. scores for autistic children in Groups A and B

Group	I.Q. Range		
	80 plus N ^o /o	55-79 N ^o /o	under 55 N ^o /o
Autistic, Group A	2 (13.3)	3 (20)	10 (66.7)
Autistic, Group B	3 (17.6)	2 (11.8)	12 (70.6)
Totals	5 (15.6)	5 (15.6)	22 (68.8)
Incomplete data	—	1	2

A consistent feature of the autistic children was their social immaturity. Of 15 low I.Q. (below 55) children for whom social quotients could be obtained, only 2 scored over S.Q. 45. Of the 9 higher I.Q. children for whom comparative data were available, all had S.Q.'s below their other test scores, 5 of them below S.Q. 62.

Because many of the children were severely disturbed and had marked abnormalities in their use of speech, and because the non-verbal test used

45-55 range. In this sense, the test results represent the relative severity of the existing handicaps, whether these are considered to be primarily "mental illness" or "mental subnormality". For the comparisons described below, a single division was made at I.Q. 55 between a "high" and a "low" I.Q. group.

T. *The relation of onset to status at the time of the Survey.* Because the clinical severity of autistic disorders and intelligence test results are related (RUTTER, 1964; WOLFF and CHESSE, 1964), the low and high I.Q. groups represented children who were relatively more or less severely affected at the survey mean age of 9.9 years. Improvement is usually evident at an earlier age (EISENBERG, 1956) so the condition of the children at the time of the survey was possibly an indicator of what their eventual social and intellectual condition would be.

Early development, type of onset and I.Q. were compared (Table 4). One child, normal until 2½ years, shared with her normal siblings a "family trait" of walking late; she was classified as having average milestones.

All but 2 children with a setback had a low I.Q.; although a setback was partly defined by average early milestones, one child with generally retarded development had a clear setback at 18-24 months. In neither of the 2 children with a high I.Q. was the setback severe.

Outcome following an onset without a setback was variable, children with the most consistently

Table 4. Summary of the type of onset in 32 autistic children according to the level of tested intelligence and early developmental status

Developmental status	Number of children				
	Total	with setback I.Q. 55+	I.Q. < 55	without setback I.Q. 55+	I.Q. < 55
<i>No marked retardation</i>					
1. All milestones average	12	2	7	3	—
2. Sitting and/or walking and/or talking "late": none "very late"	4	—	—	2	2
<i>Some marked retardation</i>					
3. Sitting "average", and					
(a) Walking, talking "very late"	2	—	—	2	—
(b) Walking "late", talking "very late"	4	—	—	—	4
(c) Walking "average", talking "very late"	1	—	—	—	1
<i>Marked retardation</i>					
4. Sitting "very late", walking and talking "late" or "very late"	9	—	1	1	7
Totals	32	2	8	8	14
Key to milestones:		"average" (months)	"late" (months)	"very late" (months)	
Sitting unsupported		up to 10	11-12	after 12	
Walking unaided		up to 17	18-20	after 20	
Age of first words		up to 16	17-20	after 20	

(the Séguin) is a timed test assuming a certain motivation, the results obtained must be regarded as representing a present level of functioning rather than a measure of capacity. It is possible that more careful testing, perhaps with different tests, might demonstrate a somewhat better ability than was apparent during the survey in a few of the low I.Q. group, 5 of whom had formboard scores in the I.Q.

retarded milestones tending to be of low I.Q. at the survey. All but 3 of the 15 children in whom late talking was associated with retarded motor milestones (groups 3 a, b, and 4 in the Table) had low I.Q.'s.

Toilet training was not included as a milestone in Table 4. Some mothers are probably more tolerant than others of difficulties of this kind, so that only

reports that a serious problem existed are likely to be comparable. A "serious" problem was defined as present if a child became dirty after becoming trained, or if bowel training was acquired only after age 4 years, or was associated with behaviour (such as persistent playing with faeces) making it a special problem, or if bowel training was never established. Of the 16 children with any marked retardation (groups 3 and 4, in Table 4), 6 presented serious toilet problems; however, neither of the children with I.Q. 55+ (group 3 a in the Table) had such difficulties. In the 7 low I.Q. children with average milestones and a setback, onset was accompanied in 5 by serious toilet problems such as loss of control, severe constipation, bowel prolapse, or playing with faeces and "spreading it all over the room".

6. *Speech.* Communicative speech (EISENBERG, 1956, as well as the functioning level of intelligence, is an indicator of the relative severity of the disorder in autistic children. In autistic groups A and B, the ability to use speech communicatively, and estimates of intelligence, varied together (Table 5). Thus, all the mute children were of low I.Q. and all those with the most nearly normal use of speech as language had I.Q.'s classified as relatively high.

Table 5. Comparison of speech in Groups A and B according to intelligence level at the survey

	I.Q. Level and Group			
	I.Q. 55+		I.Q. < 55	
	Group A	Group B	Group A	Group B
1. Speech freely and adequately used	2	3	—	—
2. Use of speech limited to some extent	3	2	2	1
3. Use of speech very limited	—	—	5	5
4. Mute	—	—	3	6*
All children	5	5	10	12

* One child was deaf.

Definitions of categories: 1. Speech is freely used for spontaneous communication; although the content may be concentrated on their own interests, there is no unwillingness to talk and what is said is sensible. 2. The children can speak sensibly, but speech may be reluctantly used, or refused in certain situations, or although articulation and quantity of spontaneous speech may be nearly normal, content may usually be repetitive and of limited value communicatively. 3. In this group were included children whose only speech was parrot phrases and echolalia, or who spoke so seldom that the usefulness of speech for them was drastically reduced, or whose more complex speech was addressed primarily to dolls or to themselves. It was not possible to have a conversation however simple with these children. One of these had a very severe articulation difficulty. 4. Children who at the survey were mute: 5 had never spoken (one was deaf), the others had lost an earlier ability to say single words, or in one case simple phrases.

Discussion

In the present survey it was assumed that accumulation of individual behaviour items would distinguish a "case" and that the greater the number and severity of the symptoms the closer the behav-

our of the child would approximate to the clinical case descriptions from which the items were derived. All interviews and ratings were made by the same worker in order to minimise differences in the interpretation of symptoms. For an autistic group defined in this way, the point where a line is drawn separating it from the population of "non-autistic" children is arbitrary. The possibility of error in the delineation of so small a group according to rather imprecise criteria in a large population is considerable. However only about 3% of the estimated total population were not screened, the reliability of the selection procedures seemed reasonably satisfactory and there appeared to be no systematic bias in the rating of the behaviour descriptions.

The 35 autistic children selected probably therefore include nearly all those in the chosen age group with the kinds and severity of behaviour here called "autistic", and the 32 included in the analyses may be considered representative of the population of "autistic" disorders. All the 35 had at some time been known to the local authority as handicapped. Only one autistic child was discovered in a school for normal children; his parents refused to be interviewed and available information about his early behaviour was scanty. This boy was one of the 7 children excluded from the behaviour ratings because of insufficient data.

The survey estimate of the prevalence of the conditions characterised by the behaviour described is thus probably a close approximation to their true frequency in the age-group studied. However, "true" prevalence may not be a useful concept in the case of a syndrome (or syndromes) so poorly defined. In addition, any children who died before age 8 years would not have been included in the survey and any who, at age 8—10, were symptom-free and who for any reason did not appear in the local authority records, would probably not have been found. There may very well be a higher prevalence at an earlier age.

Although they are not common, autistic disorders cannot be considered "rare". Applying our rates to the school-age population of the County of Middlesex (about 279,000 aged 5—14 years) there would be about 126 autistic children of all grades; 59 of them would have the marked symptom combination of group A and at least 53 would have testable I.Q.'s above 55. For administrative purposes, useful comparisons may be made with certain other severe handicaps for which published figures are probably reliable. Thus, in 1963, there were 57 blind and 175 deaf children in special schools in Middlesex (some of whom would have been over the age of 14). If the number of autistic children with I.Q.'s over 55 is taken as the minimum number who would be considered eligible for "special schooling", there would be nearly as many educable autistic children in the County as there are blind children in special schools. Since several of those allocated to

the low I.Q. group in the survey may improve, or by more intensive testing be shown to have better abilities than were elicited by the survey tests, there may well be many more autistic than blind children suitable for special education.

GOODMAN and TIZARD (1962) estimated the prevalence in Middlesex of imbeciles and idiots (I.Q. below 50) aged 10—14 years to be 3.61/1,000; applying this rate to the 5—14 year old population there would be about 1,000 school-age idiots and imbeciles in the County. In the same population there would be 73 autistic children with I.Q.'s under 55, representing about 7 per cent of the severely subnormal population.

Even allowing for the unreliability inherent in the use of poorly defined criteria, the number of autistic children found, in comparison with the number of children in the County known to have other serious handicaps such as blindness, is substantial and raises challenging problems of educational assessment and provision.

The over-all excess of boys amongst the 32 autistic children is lower than the 4 : 1 ratio reported for some other groups (e.g. KANNER, 1954; CREAK and INI, 1960) but was much higher than the 1.6 or 1.7 : 1 found, for example, in large populations of "mental defectives" (MALZBERG, 1953; HALLGREN and SJÖGREN, 1959).

An unexpected finding was that all the higher I.Q. children in both autistic sub-groups were boys. Previous reports have not suggested that boys are less severely affected nor that they tend more often to recover. The absence of autistic girls with higher scores is difficult to account for. The possible inclusion among the higher I.Q. children in group B of one or two children who might be classified as having, instead of autistic disorders, some "developmental speech disorder" (in which according to INGRAM and REID (1956) the proportion of affected boys may be very high) does not explain the absence of girls. The numbers in the survey are very small, however, and chance variations may easily affect the proportions found.

One-third of the survey cases had an onset involving a setback in development. Large proportions of cases with an onset of this kind have been reported. CREAK (1962) found about one-quarter, and WOLFF and CHES (1964) found one-half. To some extent the differences may be due to a lack of uniformity in the definition of a "setback".

Children with a setback occurring at any time during their early years are usually severely affected. This was the case in all but two of the survey children with a setback at any age from before 2 to just over 4 years. All WOLFF and CHES's cases with a setback before 2 years were severely affected; a sinister prognosis for such an early setback was reported also by EISENBERG and KANNER (1956), and for setback at 3—5 years by ANTHONY (1958). CREAK (1962), however, found no such association

between the type of onset and prognosis in a group of 108 "psychotic" children.

Although it may be difficult, especially in children in whom autistic symptoms develop gradually, to discover the precise age at which they started, all the survey children were markedly abnormal by the age of 5. The child with the latest onset had a severe setback at 4½ years. No child was found who first developed autistic symptoms after this age. The absence of later onset suggests that whatever the underlying disorders may be, autistic behaviour as described here is peculiar to disturbances beginning in the first few years of life.

The low I.Q. autistic children whose early milestones had shown marked evidence of retardation were more severely handicapped at the time of the survey than those without such early retardation. Using inability to speak or to produce a scoreable performance on the formboard, and the fact of hospital placement, as indices of the severity of their present handicaps, the differences in present status between children who had retarded milestones and those who had not may be illustrated as follows:

	All autistic children classified as "below I.Q. 55" (N=22)	
	No marked early retardation (N=9)	Some marked retardation in early milestones (N=13)
Mute	1	8
Untestable or unscorable on the formboard	3	11
In subnormality hospital or on waiting list	1	10

(See Table 4 for definition of milestones)

Any conclusion from these figures is complicated by the possible effects of institutional life (CREAK, 1963; RUTTER, 1964; TIZARD, 1964). However, all but 2 of the institutionalised children were placed after the age of 8 years, by which time their condition had shown no sign of amelioration.

The comparison of attempts to identify factors which predict social and intellectual prognosis is complicated by differences in case selection as well as by differences in the criteria used to assess outcome. Thus, amongst cases of "infantile autism" for whom EISENBERG and KANNER (1956) identify the presence of useful speech at age 5 as the most important prognostic feature, very few cases appear to have been retarded in early development, or to have shown evidence of neurological abnormalities (KANNER, 1943; KANNER and LESSER, 1958). On the other hand, amongst the "psychotic" children in whom RUTTER (1964) finds poor performance on I.Q. tests to predict outcome most usefully, a large proportion had definite evidence of brain dysfunction.

RUTTER has not provided developmental data for his series; however, it may be assumed as likely (in view of the high incidence of "organic" disorders) that many of his "subnormal" cases were de-

velopmentally retarded. If this assumption is correct, the present survey finding that amongst autistic children with low I.Q.'s those who were developmentally retarded are relatively more severely affected, suggests that more meaningful comparisons as to outcome may be made by specifying these cases separately. The most useful prognostic indicator may not be the same in all cases.

Acknowledgements. The survey was supported by a grant from the Health Department of the Middlesex County Council, arranged and administered by Dr. G. WIGLEY, Chief Medical Officer of Health and now Deputy Medical Adviser to the Greater London Council. The work was carried out under the supervision of Dr. J. K. WING and Dr. N. O'CONNOR.

References

- ANTHONY, E. J.: An aetiological approach to the diagnosis of psychosis in childhood. *Acta paedopsychiat.* 1/2, 89—100 (1958).
- BELLAK, L. (ed.): *Schizophrenia: a review of the syndrome.* New York: Logos Press 1958.
- BENDA, C. E., M. J. FARREL, and C. CHIPMAN: The inadequacy of present day concepts of mental illness in child psychiatry. *Amer. J. Psychiat.* 107, 721—729 (1951).
- BENDER, L.: Genesis in schizophrenia during childhood. *Acta paedopsychiat.* 1/2, 101—107 (1958).
- Autism in children with mental deficiency. *Amer. J. ment. Def.* 64, 81—86 (1959).
- Mental illness in childhood and heredity. *Eugenics quart.* 10, 1—11 (1963).
- , and A. E. GRUGETT: A study of certain epidemiological factors in a group of children with childhood schizophrenia. *Amer. J. Ortho-psychiat.* 26, 131—144 (1956).
- BERGMAN, P., and S. ESCALONA: Unusual sensitivities in very young children. *Psychoanal. St. Child* 3/4, 333—352 (1949).
- BRUCH, H.: The various developments in the approach to childhood schizophrenia. *Acta psychiat. neurol. scand.* 34, 1—48 (1959).
- CREAK, M.: Juvenile psychosis and mental deficiency. In *Proceedings of the London Conference on the scientific study of mental deficiency.* B. Richards (ed.), Vol. 2, 389—397. London: May and Baker 1962.
- Follow-up of cases (100) of schizophrenic syndrome of childhood. Second European Paedopsychiatric Congress, Rome, 1963.
- Childhood psychosis — a review of 100 cases. *Br. J. Psychiat.* 109, 84—89 (1963) (a).
- , and S. INI: Families of psychotic children. *J. Child Psychol. Psychiat.* 1, 156—175 (1960).
- , et al.: Schizophrenic syndrome in childhood. *Dev. Med. Child Neurol.* 3, 501—504 (1961).
- , et al.: Schizophrenic syndrome in childhood: further progress report of a working party. *Dev. Med. Child Neurol.* 4, 530—535 (1964).
- DESPERT, J. L.: Schizophrenia in children. *Psychiat. Quart.* 12, 366—371 (1938).
- Differential diagnosis between obsessive-compulsive neurosis and schizophrenia in children. In *Psychopathology of childhood*, (ed. P. H. Hoch and J. Zubin). New York: Grune and Stratton 1955, pp. 240—253.
- , and A. C. SHERWIN: Further examination of diagnostic criteria in schizophrenic illness and psychoses of infancy and early childhood. *Amer. J. Psychiat.* 114/9, 784—790 (1958).
- DOLL, E. A.: *Vineland Social Maturity Scale: manual of directions.* Minneapolis: Ed. Test Bureau 1947.
- DUNN, L. M.: *Manual for the Peabody Picture Vocabulary Test.* Minneapolis: American Guidance Service 1959.
- EARL, C. J. C.: The primitive catatonic psychoses of idiocy. *Br. J. Med. Psychol.* 14, 230—251 (1936).
- EISENBERG, L.: The autistic child in adolescence. *Amer. J. Psychiat.* 112, 607—612 (1956).
- , and L. KANNER: Early infantile autism: 1943—1955. Symposium on childhood schizophrenia. *Amer. J. Orthopsychiat.* 56, 556—566 (1956).
- FONTES, V.: Schizophrenie infantile. *Acta paedopsychiat.* 25, 183—190 (1958).
- GOODENOUGH, F. L.: *The measurement of intelligence by drawing.* New York: Yonkers-Hudson, World Book Co. 1926.
- GOODMAN, N., and J. TIZARD: Prevalence of imbecility and idiocy among children. *Br. Med. J.* 1, 216—219 (1962).
- HAAGARD, E. A., A. BREKSTAD, and Å. SKARD: On the reliability of the anamnestic interview. *J. Abn. Soc. Psychol.* 61, 311—318 (1960).
- HALLGREN, B., and T. SJÖGREN: Clinical and genetics — statistical study of schizophrenia and low grade mental deficiency in a large Swedish rural population. *Acta Psychiat. et Neurol. Scand.*, 35, Suppl. 140 (1959).
- INGRAM, T. T. S., and J. F. REID: Developmental aphasia observed in a department of child psychiatry. *Arch. Dis. Childhood* 31, 161—172 (1956).
- JAEGGI, F.: Personal communication (1963).
- KALLMAN, F. J., and B. ROTH: Genetic aspects of praedolescent schizophrenia. *Amer. J. Psychiat.* 112, 599—606 (1956).
- KANNER, L.: Autistic disturbances of affective contact. *Nerv. Child* 2, 217—250 (1943).
- Irrelevant and metaphorical language in early infantile autism. *Amer. J. Psychiat.* 103, 242—246 (1946).
- *Child psychiatry.* Third edition. Oxford: Blackwell 1957.
- The conception of wholes and parts in early infantile autism. *Amer. J. Psychiat.* 108, 23—26 (1951).
- To what extent is early infantile autism determined by constitutional inadequacies. *Res. Publ. Ass. Nerv. Ment. Dis.* 33, 378—385 (1954).
- History and present status of childhood schizophrenia in the U.S.A. *Acta Paedopsychiat.* 25, 138—149 (1958).
- , and L. I. LESSER: Early infantile autism. *Ped. Clin. N. America* 5, 711—730 (1958).
- LAPOUSE, R., and M. A. MONK: An epidemiological study of behaviour characteristics in children. *Amer. J. Publ. Hlth* 48, 1134—1144 (1958).
- LOTTER, V.: Report of a survey of the prevalence of autistic conditions in childhood in the County of Middlesex. Unpublished report to the Greater London Council, 1966.
- MAHLER, M., J. R. ROSS, and Z. DE FRIES: Clinical studies in benign and malignant cases of childhood psychosis. *Amer. J. Orthopsychiat.* 19, 295—305 (1949).
- MALZBERG, B.: Sex differences in the prevalence of mental deficiency. *Amer. J. Ment. Def.* 58, 301—305 (1953).
- NORMAN, E.: Reality relationships of schizophrenic children. *Br. J. Med. Psychol.* 27, 126—141 (1954).
- Affect and withdrawal in schizophrenic children. *Br. J. Med. Psychol.* 28, 1—17 (1955).
- PASAMANICK, B.: Epidemiology of behaviour disorders in childhood. *Res. Publ. Ass. Nerv. Ment. Dis.* 24, 397—403 (1954).
- POTTER, H. W.: Schizophrenia in children. *Amer. J. Psychiat.* 12, 1253 (1933).
- RAVEN, J. C.: *Guide to using the Mill Hill Vocabulary Scale with the progressive Matrices Scales.* London: H. K. Lewis 1958.
- REID, D. D.: *Epidemiological methods in the study of mental disorders.* Geneva: W. H. O. papers, No. 2, 1960.
- RIMLAND, B.: *Infantile autism.* New York: Appleton-Century-Crofts, 1964.
- ROBBINS, L. C.: The accuracy of parental recall of aspects of child development and of child rearing practices. *J. Abn. Soc. Psych.* 66, 261—270 (1963).
- RUTTER, M.: *Diagnosis and general aspects of child psychosis.* Address to the conference on the educational needs of psychotic children. London: Ministry of Education, 1964.
- Behavioural and cognitive characteristics of a series of psychotic children. In *Early childhood autism.* (ed.) J. K. WING, Oxford: Pergamon (1966).
- SCHREERER, M., E. ROTHMAN, and K. GOLDSTEIN: A case of idiot savant: an experimental study of personality organisation. *Psychol. Monogr.*, 58, (whole No. 269) (1945).
- SHEPHERD, M., and B. COOPER: Epidemiology and mental disorder: a review. *J. Neurol. Neurosurg. Psychiat.* 27, 277—290 (1964).
- TIZARD, J.: *Community services for the mentally handicapped.* London: O.U.P. 1964.
- The epidemiology and genetics of mental deficiency. *Dev. Med. Ch. Neurol.* 5, 287—291 (1963).

TRAMER, M.: Childhood schizophrenia as a problem of nosology. *Acta Paedopsychiat.* 29, 337—368 (1962).
 WING, J. K.: Diagnosis, epidemiology, aetiology. In *Early childhood autism*. Oxford: Pergamon, 1966.
 WOLFF, S., and S. CHESS: A behavioural study of schizophrenic children. *Acta Psychiat. Scand.* 40, 438—466 (1964).
 YAKOVLEV, P. I., M. WEINBERGER, and C. CHIPMAN: Heller's syndrome as a pattern of schizophrenic behaviour disturbance in early childhood. *Amer. J. Ment. Def.* 53, 318—337 (1948).

Appendix 1

After each of the following statements there are three columns — 'D', 'S' and 'A'. If the child shows the behaviour described by the statement to a marked degree, circle 'A'. If the child behaves somewhat according to the statement but to a lesser extent or less often, circle 'S'. If, as far as you are aware, the child does not show the behaviour, circle 'D'. Please circle *one* letter for each statement. Please note: it is very important that examples be given wherever possible. Thank you.

Statement	Doesn't Apply	Applies Somewhat	Certainly Applies
1. Unable to speak; uses only grunts or noises	D	S	A
2. Speech very muddled (but <i>not</i> due to difficulty in pronunciation)	D	S	A
3. Speaks only in single words or short phrases	D	S	A
4. Usually refers to him or herself as 'you', 'he', 'she' or by name, rather than 'I' or 'me' (Give example:)	D	S	A
5. Frequently repeats phrases without regard to their proper meaning (e.g. echoes part of phrases said to him or her) (Give example:)	D	S	A
6. Although able to speak, usually uses mime or demonstration instead (e.g. leading by the hand)	D	S	A
7. Often uses a 'special' or peculiar voice (e.g. sing-song, gruff, or squeaky, etc.) (Give example:)	D	S	A
8. Very restless. Often running about or jumping up and down. Hardly ever still	D	S	A
9. Squirmy, fidgety child — always in and out of his/her seat	D	S	A
10. Frequently shows odd movements (tick which), e.g. flapping of arms spinning round and round odd walk or posture twisting movements of hands in front of face facial grimacing other (.)	D	S	A
11. Is solitary; spends most of the time on his/her own	D	S	A
12. Makes little or no attempt to mix with other children	D	S	A
13. Avoids looking at others directly, looks past or through them	D	S	A
14. Abnormally preoccupied with a fixed idea to the exclusion of ordinary behaviour (e.g. constantly pretending to be a train or always drawing the same things over long periods) (Give example:)	D	S	A
15. Will do certain things only according to a special routine (e.g. <i>has</i> to do things in a particular order or <i>has</i> to put things in piles or rows, etc.) (Give example:)	D	S	A
16. Tends to examine things in odd ways (e.g. by sniffing or biting them) (Give example:)	D	S	A
17. Carries or collects <i>curious</i> objects such as stones or tins (Give example:)	D	S	A
18. Preoccupied with certain aspects of things (e.g. their shininess, texture or colour) (Give example:)	D	S	A
19. Very clumsy or awkward in bodily movements, co-ordinates poorly	D	S	A
20. Has marked difficulty with his/her hands (e.g. using a pencil or doing up buttons or shoe laces)	D	S	A
21. Markedly backward in school work	D	S	A
22. Although backward generally, is particularly good at some things (such as maths. or music). (Specify which:)	D	S	A
Are there any other things about this child which strike you as unusual?			

Appendix 2

Three standard case-histories, on each from groups A, B and C, are given in order to illustrate the material collected about all children in the series.

Case 8 — Group A

Early development and medical history

Female, born 7-12-55. Birth weight 6½ lbs. Illegitimate; adopted 6 weeks. Seemed normal in first 12—18 months. Sat 6 months, walked 12 months, first words began 12 months. Good child, laughed and smiled; she often woke and cried, and was then very hard to comfort. No serious illnesses.

<i>Social behaviour</i>	By 2, mother sure "something wrong". Little response to strangers talking to her, but liked tickling. At 2—3, liked cuddling on lap, but passive, no spontaneous gestures like putting arm round mother's neck. By 3, would sit on mother's lap, gazing out of window; mother convinced the child was not seeing anything — "a Buddha-like communing with herself". Had spells until 8—9 years when family would say "she's gone away". Up to about 5 years would fail to recognize father in the street; ran right past him. Would "look through" well-meaning strangers in a way the family found embarrassing. Until recently ignored other children entirely.
<i>Speech</i>	By 2, could say "dandelion", "buttercup", "want a biscuit". At 2—3, knew some rhymes and songs. From 2½, seemed not to develop further. Simple speech, ignores pronouns, no reversal of "you" and "I". Spoke very seldom, and only in odd phrases. By 3—4, would use adult's hand to achieve an object; still does this sometimes. Now talks more, but mainly in learned phrases to doll. No conversation possible. Understands ordinary commands etc. Much more vocal when in a temper, or when <i>driven</i> to speak.
<i>Motor</i>	At 2—2½, over-active; always on the go, turning on taps, emptying containers. Rocked in cot briefly from 12—18 months. In screaming fits, would bang head on cupboard at 3—3½ years, the "worst" period. Began at 4 jumping up and down when excited, still occasionally does so, and may flap her arms. Fine finger control was good, but at 3½ walking was a "lope", much on her toes, and she tended to trip over any unevenness.
<i>Sensory</i>	In pram, no response to loud noises (e.g. backfire); she is not deaf; can hear sweet paper rustle. At 3—4, would eat sawdust, dogs' excreta. Since about 5, covers ears at loud noises or when avoiding some situation.
<i>Mood</i>	From age 2, much screaming at frustration. Impossible to wait for a bus, or on a walk to hesitate between alternative routes — screamed unless she kept moving. Sometimes no discoverable reason for screaming which could be extremely violent.
<i>Repetitive-Ritualistic</i>	Before 5, she was making patterns with pencils, toy bricks; no play except these activities. Play with water taps and repetitively and incessantly emptying kitchen containers. For years certain ornaments in the home could not be changed about. Many rituals — refused to turn right when leaving the house, insisted on order of "going to bed"; changes or attempts to break the routine resulted in tantrums and screaming.
<i>Other</i>	Bowel control for 1 month at age 2; then became dirty and for years presented a difficult problem. Medical attention at 3 for retention and bowel prolapse. She would play with faeces and smear the walls and herself. Apart from early crying no special sleep disturbance. Unselfconscious exposure embarrassed her older brother (adoptive) and his friends; public masturbation occasionally noticed at about 8 years.
<i>Medical Investigations</i>	Single out-patient examination act. 2 years 7 months. Suggested diagnosis: "Behaviour disturbance". Psychotherapy from 4 to 5 years of age.
<i>Psychometric Examinations</i>	Untestable.
<i>Placement</i>	Special boarding school since 5 years.

Case 23 — Group B

<i>Early development and medical history</i>	Female, born 27-3-54. Birth weight 4¾ lbs. at term. Two older sibs. Seemed normal in first year, sat 12 mos, walked 20 months. Good baby, first words about 18 months. Mumps, chicken-pox and measles "all in a row" at 18 months. Odd head shaking. "Spasms" since about 12 months.
<i>Social behaviour</i>	Slow speech and lack of response to words led to suspicion of deafness; but child thought to have "looked at" mother normally. Often seemed to "walk over" people, pushing them out of the way. Has always been "affectionate", she likes people, will go to anyone who is "sympathetic". Distractable and overactive since 2½—3 years and might be rough with people; not aloof. Loves being tickled and will then laugh ordinarily. She liked being with other children but could not play. At school (age 4) observed to wander about by herself; was very aggressive toward other children.
<i>Speech</i>	Acquired about 8 words (never clear) "Jelly", "Mum", "Dad", "Bye-bye", "No"; all were lost by about 2½ years. Learned to sing recognizable tunes by 3—4 years, and can still do so.
<i>Motor</i>	Has rocked since about 12 months, very marked since 2½; she still does so. Severe head banging when frustrated, since about 3 years. Always wildly overactive, has run away. Jumps up and down when pleased or excited; has always twisted hands by her face, opening and shutting her hands "spasmodically". Gross motor ability good, she is quick and nimble, can climb anything, and never seems to tire.
<i>Sensory</i>	Given hearing aid at about 3 for suspected hearing loss; but could hear "sweetie" in a whisper. Always indiscriminate about what she ate; school (age 4) refers to her eating earth. At loud noises (dog barking) she would at 3—4 cover her ears with her hands.
<i>Repetitive-ritualistic</i>	Never played with toys, fleeting attention to jig-saw puzzles which she was "quite good at". Very destructive. For months at a time became attached to odd objects, such as a metal bottle label; if lost she screamed and was uncontrollably violent. Constantly flicked lights on and off, so bulbs had to be removed. Recently screams if a different route is taken to the hospital; "any day that is unpatterned would be absolute hell".
<i>Other</i>	Bowel control slow, never complete; prolapsed bowel appears from time to time. Since 2½ often awake at night, climbing about, shouting; drugs ineffective. Main interest appears to be in food: "she will eat and eat", voraciously. Public masturbation since "quite young", still engaged in. At school (age 4) reported that "she will often shudder and shake from head to feet".

<i>Medical Investigations</i>	Age 2—3: <i>Hospital:</i> EEG: no definite abnormality. No fits, not microcephalic. <i>Diagnosis:</i> Autistic, likely to prove retarded, may be partially deaf.
	Age 5—8: <i>Hospital:</i> No clinical abnormality found. <i>Diagnosis:</i> Psychosis, probably on a defective background.
<i>Psychometric Examinations</i>	Age 4—9: Merrill-Palmers: Mental Age 2—1, I.Q.=44; uncooperative. Age 10—4: Séguin formboard unscorable attempt.
<i>Placement</i>	Subnormality hospital since 5 years.
 <i>Case 39 — Group C</i>	
<i>Early Development and Medical History</i>	Male, born 11-2-53. 8 weeks premature; Birth weight 3—0 lbs. Concurrent maternal T.B.; child reared in an institution until 8 months. No information about first 18 months available, but early development very slow; by 19 months could stand but not crawl or walk. Convergent squint. Two younger siblings.
<i>Social Behaviour</i>	Seemed normal, responsive, when returned to his mother at 18 months. Has always been "affectionate", now plays with other children, would always go indiscriminately to anyone. Excluded from school (age 4—9) after 1 day for unmanageable behaviour and aggression. Related "poorly" to the psychiatrist at 5 years. When seen he was friendly and cooperative (age 11—0).
<i>Speech</i>	Said 2 or 3 words by 18—19 months — speech developed slowly, sentences appearing only at 3½—4 years. By 11 years his speech had improved greatly: then his verbal ability was "much higher" than his general level of attainment. No speech mannerisms noted.
<i>Motor</i>	Since very young jumped up and down, flapping his hands, in a frenzy of excitement. Most noticeable when spinning his wheels. Jumping behaviour a persistent mannerism, frequently noted still at age 10 years. Manual dexterity considered to be "poor on the whole", but can model wheels extraordinarily well in clay.
<i>Sensory</i>	No peculiarities noted.
<i>Mood</i>	Twice before age 5 sent home from school for unmanageable behaviour, having been admitted under age to relieve the mother. Described by school as "destructive, spiteful, disobedient, he screams at frequent intervals and for no apparent reason". Aggressiveness less but still present at 11 years.
<i>Repetitive-Ritualistic</i>	Shortly after 2 began twiddling things; soon started spinning them, jar lids, coins, wheels, with great skill. Wheel-spinning persisted strongly for next 8 years; he made wheel collections, talked constantly about them, and while spinning them jumped spasmodically, grimacing "horribly" and seeming out of touch.
<i>Other</i>	At 5 operated on for squint. Separation to an aunt at age 3 for 8 months (mother's T.B.). Bowel control by 3, still occasionally wets. Sleep always good.
<i>Medical Investigations</i>	No abnormalities reported apart from squint. Psychiatric diagnosis (age 11) "psychotic amentia of hereditary origin".
<i>Psychometric Examinations</i>	Age 5—3 Binet Mental Age 3—5: I.Q. 65 Age 6—6 Binet Mental Age 5—1: I.Q. 78 Age 10—10 Binet Mental Age 9—4: I.Q. 85 Age 11—5 Peabody P.V.T. I.Q. 103 Age 11—5 Vineland S.Q. 74.
<i>Placement</i>	5½— 7½ excluded from school: attended junior training school. 8 —10½ special unit for severely disturbed children. Now in special boarding school.

Victor Lotter, B.A.
Medical Research Council
Social Psychiatry Research Unit
Maudsley Hospital
London S.E. 5, England