ABILITIES AND BEHAVIOUR OF EPILEPTIC CHILDREN

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A SURVEY of the literature on handicapped children reveals comparatively little on the subject of epilepsy.

Most of the articles dealing with cognitive functions have been concerned wholly or mainly with verbal intelligence as measured by tests of the "Binet" type. Those relating to behavioural or personality traits have been mainly impressionistic.

Jones (1953), in a review of research in epilepsy, stated that there were few valid results in the literature, due, probably, to the inadequacy of research techniques.

Folsom (1953), reviewing recent investigations into the cognitive function in epilepsy, said that "Clinicians, studying epileptics in institutions, have reported cognitive deficit as an almost universal phenomenon in epilepsy . . . with increasing intensive study of non-institutionalized epileptic groups it has been clear that the I.Q. level of epileptics varies over the same range as that of the non-epileptic population, that whatever deficit may be characteristic of the epileptic, it is not a low I.Q." She stated that the deficits described were considered to be:

1. The effect of seizures.
2. The expression of an epileptic constitution or character.
3. Secondary to an affective disorder.
4. Together with seizures, a psychological reaction to the environment, with a typical character make-up as a predisposing factor.
5. A result of brain damage.
6. A result of psychosis.
7. Primary mental defect.

She pointed out that clinical evaluations are apt to be subjective; open to bias in the selection of cases, in the choice of processes to be investigated, and in the methods of investigation.

Folsom recommends (*inter alia*), that for future work, epileptics should be subdivided on the basis of cerebral dysfunction and seizure phenomena; that a battery of tests should be used to cover a range of intellectual processes; and that control groups should be more extensively used.

Pruyser (1953), dealing with the personality aspect of psychological testing in epilepsy, said that few psychologists had applied their methods to the study of the aetiology of personality disturbances in epileptics. He stated that the following propositions have been made in this sphere:

(*a*) That the disturbances are directly associated with the pathological brain state which also produces the seizures.
(*b*) That the epileptic personality syndrome is of constitutional origin, and as much an integral part of epilepsy as the seizure phenomena.
(*c*) That the disturbances are reactive to psychosocial stress.

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(*d*) That some epileptics, like anyone suffering from some disease, may react to their condition as if it were the dominant theme of their lives, to which everything else is made subservient.

Of the fifty references in Pruyser's article, only four studies dealt with the personality of epileptic children.

As a background to the present survey we cite some of the recent findings on abilities and behaviour of epileptic children.

Cognitive Abilities

1. *Verbal Intelligence*

Various estimates of the intelligence level of epileptic children have appeared from time to time, some based upon test results and some upon clinical impressions.

Table I summarizes test results of some recent investigations in this country and in America.

Table I
Intelligence Quotients Reported on Epileptic Children

Year	Source	Description	N.	Mean I.Q.
1947	Chalfont Colony	Special School Cases		66·0
1947	Lingfield Colony	Special School Cases		80·0
1947	Collins and Lennox	Clinic Cases	100	104·1
		(Petit Mal)	18	113·2
		(Psychomotor)	8	108·6
		(Grand Mal)	36	105·3
		(Grand Mal and Petit Mal)	25	102·7
		(Grand Mal and Psychomotor)	11	102·2
		(Brain Injured)		96·7
1951	Zimmerman *et al.*	Clinic Cases	100	93·5
		(Idiopathic Petit Mal)		105·5
		(Grand Mal and Idiopathic Petit Mal)		91·5
		(Grand Mal)		91·2
		(Symptomatic)		89·0
		(Traumatic)		89·0
1954	Henderson	Normal School Cases	365	95·5*
1955	Tenny	Special School Programme, Detroit	690	84·0

From the above results it would appear that the (verbal) intelligence level is related to the kind of school attended, and the type of epilepsy; with higher I.Q.s in normal schools, in idiopathic epilepsy and in petit mal.

Collins and Lennox (1946) found a negative correlation between intelligence and age of onset, i.e. a lower intelligence level with earlier onset.

They also reported a relationship between intelligence and electrographic patterns—the cases with mildly slow or fast waves had the higher I.Q.s, average 108, and those with very fast or very slow waves had the lower, average 92·4.

According to Folsom (1953), "Investigations to date reveal no consistent relationship between cognitive deficit, as evaluated by low I.Q. or decrease in I.Q. on retest, and the factors of duration of illness, severity or frequency of seizures, or absolute number of seizures . . . the wide variability in age groups in most of the investigations mentioned preclude a proper evaluation of these factors."

* Median Score.

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2. *Other Abilities*

In Burt's survey (1937), the epileptic children showed "typical slowness of mental reaction, and marked failures of memory and motor promptitude".

According to Bradley (1946), "The attention span is apt to be short and power of concentration poor. In school, arithmetic is most likely to be the subject presenting exceptional difficulty." In a later article (1947), he mentions "vacillations in ability to recall material which has been previously learned".

Personality and Behaviour Disorders

In this sphere controversy revolves around a central issue, i.e. whether there is or is not an "Epileptic Personality". At one time few clinicians had any doubt in the matter. All epileptics were said to have well-marked and mostly undesirable characteristics. As mentioned before, impressions were based almost entirely upon experience with institutional cases. The full catalogue of epileptic traits mentioned in the literature is a lengthy one. Although there has not been complete agreement as to individual traits, some of them have been repeated so often that they have taken on the status of essential attributes.

Since the interest has moved to extra-mural epileptics there has been a swing of the pendulum, with a tendency to affirm that there is no such thing as an "Epileptic Personality". In the writer's experience, many workers say that "There is something about epileptics", but they would not like to commit themselves about specific traits. They might agree with Piotrowski (Pruyser, 1953), that "Epileptics share many traits but they cannot all be said to have the same personality".

Some writers believe that the "Epileptic Personality", if there is such, manifests itself gradually over a period of years, and that it is much less evident in epileptic children.

Some of the recent evidence for and against the existence of specific traits in epileptic children should, perhaps, be mentioned.

Bradley (1946) said, "The writer's experience with large numbers of ambulatory, intelligent convulsive children sharing with other patients the full and active life of a children's psychiatric hospital, free from community prejudice and parental worries, has convinced him that the personal characteristics and problems of most convulsive children are very similar to one another if one knows what to look for. Moreover, these characteristics distinguish most such patients from their non-convulsive brothers and sisters prior to entering the neutral environment in which they have been observed. Sudden variability in mood with impulsive actions and periodic, apparently unprecipitated irritability are notably conspicuous. Physical hyperactivity and restlessness are almost as prominent . . . No one of these symptoms is, of course, specific for an underlying convulsive disorder, but their combination is so frequent as to be impressive. They are also seen in children with electroencephalographic patterns of typical convulsive form even when the seizures are of rare occurrence or have apparently never been observed clinically. This suggests that repeated disturbance of the brain physiology which we can record electrically even though we do not understand it provides an 'organic' or 'constitutional' basis for the behaviour of such children regardless of their other life experience." Bradley also recognizes secondary reactions to the convulsive disorders and the resulting distorted attitudes of the world towards them (1947). He mentions, for example, feelings of rejection, hostility, aggressiveness, incessant demand for attention, delinquency, sense of guilt.

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Bridge (1949) spoke of prodromal personality disorders. There was, he thought, a physical basis for the early symptoms, but there was probably exacerbation due to environmental causes. He also stated that the behaviour of epileptic children was related to the previous personality and gave lists of traits which he found in aggressive and in submissive individuals. He was, however, of the opinion that there was no basis for the concept of the "Epileptic Personality".

Pond (1942) said that petit mal children were usually stubborn, passive, and serious, while brain-damaged children were aggressive.

Some writers have found signs characteristic of epileptic children in the Rorschach Test which, as Pruyser says (1953), appears to have been the chief tool used by psychologists in the investigation of the epileptic's personality.

Delay *et al.* (1955), in their excellent review of the use of the Rorschach Test in epilepsy, mention four *controlled* studies on epileptic children, by Kogan (1947), Arluck (1940), Zehrer (1951), and Franco (1952). These studies tried to answer the following questions:

(*a*) Is the personality of the epileptic child different from that of the normal child?

(*b*) Does the personality of the epileptic child differ from that of non-epileptic children with behaviour disorders ('troubles du caractère')?

(*c*) What is the role of reaction to the illness in epileptic children; and

(*d*) What part does heredity play in the epileptic personality?

None of these studies is decisive, and the authors (Delay *et al.*) conclude (p. 146): "Il est à l'heure actuelle impossible de considérer comme acquis aucun résultat concernant le test de Rorschach chez les enfants épileptiques. Les rares études contrôlées consacrées à ce problème donnent des résultats contradictoires. S'il est probable que les mêmes facteurs jouent dans la formation de la personnalité des enfants épileptiques que dans celle des adultes, la démonstration définitive reste encore à apporter."

Many writers have found the behaviour of epileptic children to be similar to that of brain-injured children, e.g. Pacella (1948), Bender (Bradley, 1951). Some consider that the behaviour is due, wholly or partly, to cerebral dysrhythmia. Thus, Sands (1946)—"Some of the behaviour in a person afflicted with epilepsy seems to be due to disturbances in the chemical and electrical reactions in the brain cells, for often, with treatment by drugs, some behaviour symptoms disappear immediately."* He goes on to say "The personality of a child with epilepsy is not the result of his seizures. On the contrary, his personality, like that of any other child, will or will not be wholesome, depending upon how his parents, family, playmates, teachers, and others accept him as an individual."

Jasper (Bradley, 1951) said that "any part of the brain occupied by epileptiform discharge is lost to the individual for normal adaptation or integrative behaviour".

It is, of course, common knowledge that the behaviour of some epileptic children is somewhat worse in the pre-ictal period and better in the post-ictal period. In some others the reverse has been reported, though malbehaviour soon after an attack may sometimes be due to mismanagement of the patient during a confusional phase.

The accumulated evidence for and against an "Epileptic Personality" is scientifically unconvincing. It is questionable whether tests of the projection

* Price (1950) points out that toxicity produced by overdosage can produce behaviour disorders.

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type will add much to our knowledge on this subject. The writer agrees with Pruyser (1953) that "If one wants to study the psychodynamic correlates of paroxysmal symptoms, such as epilepsy, a longitudinal approach seems to be indicated. The patient should be studied from day to day, or from hour to hour, and the focus of the study should be the changes that take place in the important psychological variables.

In the present study we have indicated some variables which might usefully be taken into account in such a study. Our findings do not support the concept of an "Epileptic Personality" in children; rather they stress the complexity of the problem, and the unwisdom of adding further purely impressionistic evidence to an already shaky edifice.

The Present Investigation

The general aim of the investigation was to verify or otherwise some of the traits attributed to epileptic children and, in particular:

(*i*) To study certain cognitive abilities of epileptic children drawn from three kinds of schools—normal schools, a special residential school for epileptic children, and a school for the physically-handicapped.

(*ii*) To compare the test results of the epileptic children with those of a group of non-epileptic children, individually matched as closely as possible for age and sex with the epileptic group.

(*iii*) To correlate test scores with certain variables associated with epilepsy, and

(*iv*) To correlate these variables with each other.

An ancillary study of behaviour at home and at school has been made, based upon information received from parents, teachers, doctors, and others who have had dealings with the children.

The Epileptic Subjects

The main group consisted of fifty-six epileptic children equally divided as to sex—twenty-eight from normal schools in Birmingham, and twenty-eight Birmingham children attending a special residential school for epileptics. The secondary group consisted of twelve epileptic children at a physically-handicapped school in Birmingham; most of these children had hemiplegia or quadriplegia in addition to their epilepsy.

The composition of the sample was, therefore: normal schools 41 per cent., special school for epileptics 41 per cent., and physically-handicapped school 18 per cent.

This compares with a distribution of epileptic children in Birmingham of: normal schools 61 per cent., residential school 23 per cent., physically-handicapped schools 6 per cent., educationally subnormal schools 7 per cent., others 3 per cent. (1953). The median ages of the main sample were: girls 11·0 years, boys 11·5 years.

The Control Group

This was drawn from primary and secondary schools in an "average" district. The children were matched, as nearly as possible, with the epileptic children for age—girls and boys separately and individually. The socio-economic level was approximately the same for both epileptic and control groups. The original intention was to take a random sample at each age from the school registers, but as the schools were streamed it was decided to aim instead at the

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same proportion of A, B, and C-stream children in the sample as in the school population, and this was done at each age-level. Two of the cases had to be excluded later, and the control group therefore comprises 54 cases as against the 56 epileptic cases. Girls and boys are equal in number. The median age was 10·5 years in each case.

The median I.Q. of the control group is 100·5.

The Tests

A large number of tests was considered; the following being finally selected:

1. The Revised Stanford-Binet Tests of Intelligence (Terman-Merrill Scale, Form L.) 1937.

2. The Gates' Oral Paragraph Reading Test (part of the Gates' Diagnostic Reading Tests), 1945.

3. The Burt Oral (Graded) Arithmetical Problems Test, 1939.

4. The Van der Lugt Psychomotor Series, Tests 1, 6, 9, 10.

As the last-named series is not much used in this country a brief description of the tests follows:

The series tests, primarily, manual ability—"continuous control of one or both hands and fingers". Speed, pressure, accuracy, co-ordination, steadiness, and motor memory are involved. The norms were derived from 2,128 Dutch children and 700 American children adjusted to the original sample. The four tests used here—three of them timed—were selected because they are almost "pure" dexterity tests, i.e. little intellectual effort is required. Mental ages are available for each test.

Test 1 has a rectangular metal base, a rod to screw into it, and fifteen metal rings. The rings are removed from the rod, one at a time, and placed on the table as quickly as possible with each hand separately. The rod is then unscrewed and the rings are carried singly across the baseboard and back again with the board in two positions. Finally, they are moved right round the board with each hand.

Test 6 consists of a metal bar as pencil holder, with a central thumbscrew. A pencil is fixed in the bar to project five inches. The subject holds the bar with the first three fingers and thumb of both hands and tries to draw straight lines eight inches long from top to bottom of the paper and vice versa. The lines are drawn with and without guide lines.

Test 9 has a rectangular metal base drilled with thirty-two holes, sixteen with left-hand thread and sixteen with right-hand. At each end of the base is a container with the appropriate screws. The subject takes up a screw with each hand and screws them into the holes simultaneously, until the board is full.

Test 10 has a square metal base with eighteen "cups" and eighteen smaller holes in it, alternately. There are two containers, one to the left of the board with marbles in it, and the other to the right with metal pegs in it. The subject has to pick up a marble and a peg and place them simultaneously in the receptacles. For alternate placings the hands have to be crossed.

Results of the Survey

1. *Composite Test Results*

Table II shows the mean quotients for the epileptic and control groups on the four tests separately and on the average of the four.

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TABLE II

Mean Scores on the Four Tests and on the Average of the Four: Epileptics and Controls

Group	Mean Test Scores				
	Intelligence	Reading	Arithmetic	Motor	Average
Controls:					
All	99·8	102·9	83·0	100·4	96·3
Girls	96·1	102·3	80·0	96·3	93·9
Boys	103·4	103·4	85·0	103·7	98·4
Epileptics:					
All	87·5	94·0	75·3	88·2	86·3
Girls	83·0	91·7	71·2	83·9	82·3
Boys	92·1	96·4	79·4	92·5	90·3
Normal schools	95·9	100·6	83·3	91·5	92·9
Residential school	79·2	83·5	66·6	84·9	79·7
P.H. school (brain injured) ..	60·0	71·5	51·0	51·7	58·4
(Brain injured, main sample) ..	78·0	81·5	63·1	71·0	72·8

The composite score-deficit of the epileptic children in the main sample, when compared with controls, is 10 points, or, approximately nine months of mental age.

Deficits on individual tests range from 7·7 points on mental arithmetic to 12·3 points on verbal intelligence and psychomotor tests.

As expected, the normal schools epileptics score higher than the residential school cases on all four tests, the average (composite) discrepancy between them being 13·2 points, with individual test-differences ranging from 6·6 points on the psychomotor series to approximately 17 points on the other three tests. At the extremes are the normal school boys, whose scores are almost on a par with the control group scores (on the arithmetic test they are actually superior to the control group by 5 points) and the residential school girls, whose average deficit is 17·4 points.

Boys are superior to girls in both epileptic and control groups, the superiority being only slightly greater in the epileptic group, i.e. 8 points as against 4·5 points in the control group. The epileptic boys have a slightly higher "scatter" than the epileptic girls on all tests except the psychomotor series.

The significance of the score-differences between the epileptic and control groups was determined by the critical ratio method (Diff./S.E. Diff.). With the following exceptions, all differences are significant at or above the 5 per cent. level of confidence:

Epileptic boys—reading and arithmetic.

Normal schools epileptics—intelligence, reading, arithmetic.

The merit-order of the tests is the same for both epileptic and control groups, with reading highest and arithmetic lowest, and the range of scores between these two tests is almost identical for the two groups, i.e. approximately 20 points.

On the other hand, the "scatter" or intra-test score variation as measured by V-scores (100 S.D./M) is approximately 60 per cent. greater in the main epileptic group than in the control group.

In general, therefore, the epileptic children score lower on all four tests, though the differences are not very great. The general pattern of abilities is the same for epileptics and controls, but the epileptic children are more heterogeneous in their scores. The range of scores in the epileptic group is from 38 to 145 points and in the control group 57 to 141 points.

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2. *The Tests Considered Individually*

(a) *Intelligence Test.* This test shares with the psychomotor series the highest score-deficit in the main epileptic group, i.e. 12·3 points. The test shows the least scatter of the four.

Collins and Lennox (1946), analysed items of the Terman-Merrill Scale on 100 epileptic children, placing the items in order of merit. No control group was used in their survey. The highest scores were on Orientation, Numerical Items, and Verbal Items, in that order. Memory, Judgment and Reasoning items came next, with Form-Perception lowest.

We have analysed the Terman-Merrill results, using different categories from those of Collins and Lennox. Table III shows the score-discrepancies of the epileptic children as compared with controls.

TABLE III

Mean Score-Discrepancies, Epileptics and Controls, on Five Categories of the Terman-Merrill Scale (Mental Ages)

Group	Word Association	Memory	Language	Reasoning	Perception	Average
All epileptics	−2·81	−2·28	−1·85	−1·61	−1·62	−1·91
Epileptic girls	−2·95	−2·40	−1·83	−1·63	−1·65	−1·95
Normal schools epileptics ..	−2·08	−2·13	−1·86	−1·57	−0·94	−1·85
Residential epileptics ..	−3·79	−3·61	−3·28	−2·99	−2·81	−3·26

As the Table shows, Word Association, i.e. saying as many words as possible in one minute, shows the greatest discrepancy. The epileptic children produced, on the average, the same number of words as the control group, i.e. 25, but the average age of the epileptics to whom the items were administered was over two years higher than that of the corresponding control cases.

Immediate memory for various kinds of material, visual and auditory, shows the next highest deficit. This would seem to support Burt's findings (1937) of "marked failures of memory . . ." in epileptic children.

Linguistic items, e.g. vocabulary, rhymes, sentence completion, disordered sentences, etc., follow, with a deficit of 1·8 years.

Reasoning, e.g. giving opposites, and similarities, spotting absurdities, problem solving, etc., shares fourth place with perception, e.g. "Search", report, etc., with a deficit of 1·6 years.

In our survey, therefore, perception and reasoning show the highest scores, while in Collins and Lennox's survey they rank lowest. The two surveys agree, broadly, in regard to verbal and memory items.

(b) *The Reading Test.* This test produced the highest scores of the four in all the epileptic groups and in the control group. It also shows the highest "scatter" and is the most sensitive to the influence of other variables. There was no obvious difference between the two groups as to the type of reading errors committed.

(c) *The Arithmetic Test.* Our results confirm that epileptic children find difficulty with mental arithmetic in relation to other subjects, but the difficulty is not confined to them. The control group had similar difficulty, and, indeed, the epileptic deficit of 7·7 points on this test is the smallest of the four. The normal schools epileptic boys actually score 5 points higher than the control group on this test. Only three children out of 122 achieved the "ceiling" age on this test, i.e. 14+ years. The epileptic children with cerebral injury found exceptional difficulty with the test. Those in the main sample averaged only 63

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points, while those in the physically-handicapped school averaged as low as 51 points.

It should be mentioned that this test is untimed, and it may be that on a timed test the epileptic deficit might have been greater, but we have no evidence to offer on this point. The author of the test says (1939) "There is no time element . . . care must be taken to give even the most tardy time to arrive at the best answer he can".

(d) *The Psychomotor Test.* The epileptic deficit of 12·2 points is almost identical with that on the verbal intelligence test.

The residential school cases did comparatively well on this series, their average score being only 6·6 points below that of the normal schools epileptics.

The brain-injured cases in the main sample also performed quite creditably on the test, with a mean score of 71 points—8 points higher than their arithmetic score. The children with physical handicaps, on the other hand, had the same mean score (51 points) on both these tests. They were, of course, handicapped on the manual tests by a loss of power in one or both hands.

Of the four subtests in the series, the greatest deficit of the epileptic group (14 points) was on the screws test, which requires no mean degree of dexterity. The smallest deficit of 5 points was on the two-handed drawing test, which is untimed.

The results of the psychomotor series on the epileptic group as a whole, support Burt's findings (1937) as to "failure of motor promptitude" in epileptic children.

3. *Test Results Related to Other Variables*

In Table IV we have shown test score discrepancies associated with certain variables—as compared with the rest of the cases, in each instance.

TABLE IV
Mean Score-Discrepancies (Quotients) for Certain Aspects of Epilepsy

Variable	Intelligence	Reading	Arithmetic	Motor	Composite
Grand mal seizures ..	+13·4	+11·3	+11·9	−0·9	+8·9
Positive family history ..	+4·7	−0·8	+8·7	+2·9	+3·9
Firstborn children ..	+3·5	+1·9	−3·7	−3·5	−0·4
Early neurosis	+1·0	+2·0	−2·0	−5·0	−1·0
Late milestones	−2·4	+1·0	−5·9	−1·9	−2·3
Petit mal seizures ..	−4·0	−12·7	−0·8	+5·5	−3·0
Frequent seizures	−10·0	+5·0	−9·0	+1·0	−3·2
Grossly abnormal EEG ..	−4·0	−7·3	−7·2	+5·4	−3·2
Abnormal birth	−0·3	−1·5	−2·9	−10·3	−3·7
Dual seizures	−9·3	+1·4	−11·1	−4·6	−5·9
Longer duration	−5·2	−9·0	−6·0	−12·5	−8·2
Earlier onset	−4·7	−11·5	−4·0	−15·7	−9·0
Precipitants	−8·0	−11·0	−8·0	−10·0	−9·2
Residential school	−16·7	−17·1	−16·7	−6·6	−14·3
Negative behaviour ..	−10·4	−21·6	−12·2	−14·8	−14·8
Brain injury: main sample	−11·1	−14·7	−14·5	−20·0	−15·1
Bad behaviour	−15·5	−28·1	−18·2	−15·5	−19·3
Brain injury: P.H. school	−30·8	−24·4	−27·0	−38·7	−30·2

It will be noted that the highest score-deficits (composite score) are associated with brain injury, bad behaviour, negative behaviour, and attendance at the residential school. An accumulation of such attributes would be likely to have serious adverse effects upon mental functions. Only two of the variables

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are associated with higher scores, i.e. grand mal seizures and a family history of epilepsy. Only two groups in fact (not in the table) have higher scores, i.e. the normal schools cases and the good behaviour cases.

Variables such as primogeniture, early neurosis, late milestones, petit mal seizures, frequent seizures, abnormal birth, and grossly abnormal EEGs seem to affect scores (composite) comparatively little.

4. *Behaviour Disorders*

Information about the personality and behaviour of the epileptic children was obtained from parents, teachers, school medical officers, case files of the Birmingham Children's Hospital and others who had dealings with the children. The behaviour enquiry is supplementary to the main study of cognitive abilities. It was not intended to be a thorough and intensive investigation on the lines suggested by Pruyser (1953).

We were able to divide our main sample, on the basis of their behaviour, into three fairly well-defined groups, i.e. "Good", "Negative", and "Bad" behaviour groups, with frequencies of 37 per cent., 28 per cent., and 35 per cent. respectively. (Bridge found, among his 742 epileptic children, 9 per cent. with severe personality disorders, 37 per cent. with moderate disorders, and 54 per cent. "None or unknown".)

The badly-behaved children in our survey were described as "Aggressive, violent, bad-tempered, truculent, insolent, spiteful, destructive, sadistic, in need of constant supervision," etc. There were, in this group, eight girls and twelve boys.

The "negative" behaviour group—ten girls and five boys—were described as "sullen, solitary, low-spirited, easily led, timid, unstable, oversensitive, moody, immature, dependent," etc. These traits were, in general, less troublesome socially, but were none the less a bar to proper school progress.

The "good" cases, equally divided as to sex, showed few undesirable traits. Some were described in felicitous terms like "Polite, happy, lovable, pleasant, popular," etc.

The average (composite) test scores for the above three groups were 77·2 points, 81·6 points, and 96·5 points respectively, i.e. there was a definite downward trend in test scores with worsening behaviour.

Taking other variables, the only one which shows a significant correlation with bad behaviour is attendance at the residential school ($P = \cdot 01$). This is understandable, since bad behaviour is one of the reasons for referring epileptic children to the school.* Other correlations—or associations—with bad behaviour which, though not significant, showed definite trends, were brain injury, precipitating circumstances ("Symptomatic" cases), grossly abnormal EEGs, petit mal seizures, frequent seizures, late milestones, and longer duration of the epilepsy.

Negative behaviour shows no significant associations with other variables, and the only noteworthy associations are with primogeniture, and late milestones.

Good behaviour shows positive, though not significant associations with grand mal seizures, normal milestones, primogeniture, attendance at normal

* At the time of the survey thirteen of the 28 residential school cases had been referred there because of severity or frequency of seizures, six for bad behaviour, and nine for both seizures and behaviour. About 75 per cent. of the residential cases showed some undesirable traits (bad or negative behaviour) as against about 50 per cent. in the normal schools.

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schools, and shorter duration. There are no known cases of brain injury among the well-behaved children.

When a comparison was made between the twelve "best" and the twelve "worst" cases in the main epileptic sample the differences mentioned were strongly accentuated. The difference between the two groups on test scores (composite) rose to 26 points.

It is evident that the behaviour of this group of epileptic children is associated with and perhaps consequent upon very many factors, some of which have been mentioned. Such variables would need to be taken into account in a scientific study of epileptic behaviour.

5. *Relationships Between Variables Other than Tests*

In all, eighteen variables were studied, and the degree of association between each one and all the others was determined by the χ^2 method. Seizure-type and behaviour are trichotomous variables, all the rest being dichotomous.

As Table V shows, five associations are significant at or above the 5 per cent. level of confidence, while a further eight are between the 5 per cent. and 10 per cent. levels of confidence. Other associations showed definite trends without being statistically significant.

TABLE V
Associations Between Certain Epileptic Variables

Variables	χ^2	Significance Level
Dual and frequent seizures	19·00	·01
Dual seizures and residential school	19·30	·01
Residential school and bad behaviour	8·44	·01
Positive history of epilepsy and early neurosis	5·72	·02
Dual seizures and normal birth	5·65	·02
Late milestones and early neurosis	3·59	·06
Precipitants and bad behaviour	5·60	·06
Negative family history and grossly abnormal EEG	3·35	·07
Abnormal birth and primogeniture	3·33	·08
Abnormal birth and late milestones	2·90	·09
Negative family history and primogeniture	2·62	·10
Male sex and positive family history	2·58	·10
Negative behaviour and primogeniture	4·61	·10

Behaviour has been mentioned in the previous section: the other variables and their associations are as follows:

Sex Differences

The epileptic girls have a higher incidence of negative behaviour, grand mal seizures, abnormal births, and grossly abnormal EEGs, while the boys are higher in respect of positive family history, bad behaviour, frequent seizures, and dual seizures. None of these differences is, however, statistically significant.

School

Epileptic children at the residential school have more cases of dual seizures ($P = \cdot 01$), bad behaviour ($P = \cdot 01$), grossly abnormal EEGs, frequent seizures, and precipitants; while those attending normal schools were higher in respect of abnormal births, grand mal seizures ($P = \cdot 01$), early neurosis, negative

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behaviour, late milestones, positive family history, and earlier onset. There is no difference in regard to duration of epilepsy.

Price (1950) found that normal school epileptics were characterized by later onset and shorter duration, less frequent seizures, idiopathic epilepsy, and normal capacity. We find ourselves in agreement on the last three points but not on the first two.

Age of Onset and Duration

Both earlier onset and longer duration (based upon a comparison of two groups of 0 to 5 and 6 to 11 years in each instance) have an overall adverse effect, the latter slightly more so than the former.

Four variables are associated with both early onset and longer duration, viz. brain injury, precipitants, abnormal birth, and early neurosis.

Petit mal seizures and bad behaviour are associated with a longer duration, while grand mal seizures show a later onset and shorter duration—by two years.

Folsom (1953) suggests that early onset may have adverse effects, (*i*) by interfering with normal schooling; (*ii*) by the production of permanent changes in the immature brain by the grand mal seizures; and (*iii*) by early brain damage resulting in early "mental defect".

Type of Seizure

Of the fifty-six cases in our sample nineteen (34 per cent.) suffered from grand mal, twenty-one (37 per cent.) from petit mal, including akinetic seizures, and sixteen (29 per cent.) from dual seizures, i.e. grand mal and petit mal.* Our sample has a higher proportion of dual cases than is commonly reported. Most of them attended the residential school, where it is possible that seizures are more closely observed than elsewhere, apart from the likelihood that such cases were referred there because they were dual cases.

Two correlations (χ^2) are statistically significant at the 1 per cent. level of confidence, i.e. dual seizures with frequent seizures and residential school attendance. Other notable associations with dual seizures are abnormal birth and grossly abnormal EEGs. Grand mal seizures are associated mainly with abnormal birth, good behaviour, infrequent seizures, and normal school. The only association worthy of note with petit mal seizures is a much longer duration of epilepsy—$7\frac{8}{12}$ years.

Frequency of Seizures

Thirty-two per cent. of our cases had frequent seizures, and 57 per cent. infrequent seizures. The composite test results for the main sample showed only two points' difference between the cases with frequent and those with infrequent seizures. The frequent grand mal cases were 12 points lower than the infrequent cases, while the frequent petit mal cases actually had an 11-point superiority. The latter result is interesting in the light of Lennox's statement (1945) that personality or intelligence may be barely affected by thousands of petit mal seizures.

Precipitating Circumstances

In thirty-three (59 per cent.) of our cases the onset of epilepsy closely

* It is possible that a more intensive investigation of these cases in the light of recent typology, e.g. that of Penfield and Jasper (1954) may have yielded a different classification.

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followed an event which we have called a precipitating circumstance—a term which is more commonly used in relation to individual seizures.

Fourteen cases of "Shock" formed the largest sub-group. One boy saw his father's "leg blown off and eye blown out" in an air raid, two girls witnessed the death of near relatives, one girl was frightened by an Alsatian dog putting its paws on her shoulders, another girl's fits started soon after seeing a "horror" film, and one boy's after being pushed into a swimming bath.

The second largest sub-group—nine cases—was that of the febrile illnesses such as meningitis, pneumonia, rheumatic fever.

Other precipitants were accidents, physical shock, etc. These cases have an average score-deficit of 10 points, and a slightly positive overall association with other adverse variables (Table VI). The more notable associations were with bad behaviour, abnormal birth, and primogeniture. There was a negative association with grossly abnormal EEGs. The age of onset was much earlier in this group.

Cerebral Injury

Eight cases in the main sample—four of each sex—gave evidence of cerebral injury at birth or subsequently. Other cases might, by inference, have been included, but the evidence was not conclusive. This group of cases, though small, is an interesting one, and brief histories of four of them are appended.

The average test score of these cases—72 points—was 14 points below that of the rest of the sample, and 23 points below that of the controls. The brain-injured physically-handicapped cases have the lowest scores, average 58 points.

Family History of Epilepsy

There seems to be some disagreement as to the incidence of a family history of epilepsy. Some writers believe that a hereditary factor is present in most, if not in all cases of epilepsy, e.g. Shanks (1949). Alström (Fairfield, 1954) found no history of epilepsy in 889 out of 897 cases. Lennox (1951) reported a history of seizures in 20 per cent. of relatives, while Tenny (1955) found 43 per cent. positive history in 765 epileptic children. Kimball and Hersh (1955) in an analysis of 520 sibships in which at least one child was epileptic found 294 cases with one parent affected, 222 with neither, and 4 with both. They stated that if one parent has a genetic constitution for epilepsy, the frequency among children is about 36 per cent., and if one child in such a family has epilepsy, the numerical probability of another child having epilepsy is about one in eight.

In our sample 46 per cent. presented a history of epilepsy, ten girls and sixteen boys, with 20 per cent. history in parents, 16 per cent. in second degree relatives, and the remaining 10 per cent. in more distant relatives. Five girls and four boys had a paternal history, four girls and eleven boys a maternal history, and one girl and one boy had a history on both sides of the family.

The average score-difference between the positive and negative cases is only 3 points, in favour of the former. When the positive cases were divided into degrees of relationship, test scores showed a consistent drop as the relationship of the epileptic relative became more remote.

The only positive associations worthy of note between family history of epilepsy and other variables are those with early neurosis and frequent seizures, the former being significant at the 2 per cent. level of confidence.

The average age of onset is one year earlier for the positive history cases but there is little difference between them in regard to duration of illness.

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Age of Mother at the Birth of the Epileptic Child

The mean age of the mothers at the birth of the children in our survey was 30·6 years for both sexes of children. This seemed rather high. We were able to make a comparison with all Birmingham mothers, but only in respect of firstborn children (1953). The average ages were 29·5 and 23·5 years respectively, i.e. the mothers of the epileptic children were, on the average, six years older at the birth of their first child.

The mother's age, is not, however, significantly related to any of the other variables.

Abnormal Birth

Thirty per cent. of the children in the main sample were, apparently, born abnormally. In the absence of clear evidence from the doctor or midwife who attended the birth one cannot be absolutely certain in every case, but we were satisfied with the evidence on the whole.

Prematurity, instrumental delivery, breech birth, etc., are not always or necessarily regarded as abnormal these days but we have included such cases. Bridge (1949), one of the leading authorities on epilepsy in children, is strongly inclined to pay attention to any birth anomaly as a potential cause of cerebral damage, giving, as instances—distortion of skull with injury to intracranial vessels, uneven discharge of venous pressure, asphyxial necrosis of nerve-cells, venous haemorrhage, etc. He adds that forceps delivery and prolonged labour seemed to be the most important antecedents in cases of birth injury who subsequently developed epilepsy.

Our cases—ten girls and six boys—included three cases of instrumental birth, three of prolonged labour, and five premature births.*

The only test showing a significant score-deficit in the abnormal birth group is the psychomotor series, with −10 points.

There is a significant correlation (P = ·02) between *normal* birth and dual seizures.

Two associations, both positive, approach significance, viz. with primogeniture (P = ·08), and late milestones (P = ·09).

Primogeniture

In our main sample fifteen cases—28·6 per cent.—were firstborn children, with equal division as to sex.

Their test scores show virtually no difference from those of the later born children.

The only notable positive associations with primogeniture are: abnormal birth, negative behaviour, and a positive history of epilepsy.

Milestones

Of fifty-three cases on which information was available thirteen or 25 per cent. were significantly late in their milestones, i.e. sitting up unassisted, walking, talking, etc. They were equally divided as to sex.

The test scores of these late developers differed insignificantly from those of the rest of the group, a rather surprising result.

Notable, but statistically insignificant associations between late milestones

* These were taken on a chronological basis. The tendency nowadays is to reckon prematurity in terms of birth weight, i.e. 5½ lb. or less.

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and other variables were: early neurosis, abnormal birth, and negative behaviour.

Early Neurosis

Fifty-two per cent. of the main sample showed neurotic signs in infancy, with equal division as to sex.*

The neurotic traits recorded include enuresis, nail-biting, sleep-walking, temper outbursts, night terrors, screaming, stammering, biting clothes, feeding difficulties, head banging, etc.†

The average test scores of the neurotic and non-neurotic groups are almost identical.

The only two correlations worthy of note are with a positive history of epilepsy and late milestones. The average duration of epilepsy is one year longer for the neurotic cases.

Electrographic Data

EEG data were available for forty-one of our cases in the main sample. Three records were "Normal or Doubtful"; twenty-two were abnormal but not necessarily typical of epilepsy, while sixteen were grossly abnormal and strongly suggestive of epilepsy. We have made comparisons between the two broad degrees of abnormality.

Test scores show almost no difference between the two groups.

None of the other variables shows a significant association with grossly abnormal EEGs, but four show trends, viz. dual seizures, bad behaviour, attendance at residential school, and frequent seizures. There was an inverse relationship between grossly abnormal EEGs and six variables, notably positive history, grand mal seizures, and precipitants.

Scores on the reading, intelligence, and arithmetic tests showed only minor deficits in the grossly abnormal cases, while scores on the psychomotor series were actually higher in these cases.

Over-all "Saturation"

A final set of figures (Table VI), gives some indication of the degree of association between each of the above variables and all the others. Taking each variable in turn, and using the χ^2 tables, we have calculated the percentage incidence of each variable associated with it—and its opposite. These percentages were then summed and averaged. The positive values indicate high "saturations". It will be seen from the table that the brain-injured cases have the highest percentage of what may be called adverse associations, with dual seizures and bad behaviour next in order. Grossly abnormal EEGs, grand mal cases, and positive family history show the lowest percentages.

* Fuchs (1947) found signs of emotional conflict in all of 25 epileptic children. While he found no evidence for an "Epileptic Personality" he found that epileptic children are "generally nervous".

† Some of these traits could be undiscovered epileptic manifestations.

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TABLE VI
Average "Saturation" of Certain Variables with Other Variables

Variable	Average "Saturation" Positive Per cent.	Negative Per cent.	Balance
Cerebral injury	54·0	37·0	+17·0
Dual seizures	47·5	36·0	+11·5
Bad behaviour	44·8	33·7	+11·1
Late milestones	43·7	36·3	+7·4
Frequent seizures	42·0	35·9	+6·1
Negative behaviour	39·7	33·6	+6·1
Precipitants	37·1	31·9	+5·2
Petit mal seizures	40·0	37·3	+2·7
Early neurosis	37·0	35·2	+1·8
Abnormal birth	39·3	37·5	+1·8
Primogeniture	34·3	32·7	+1·6
Residential school	36·3	35·1	+1·2
Family history of epilepsy	34·2	37·1	−2·9
Grossly abnormal EEGs	35·4	39·4	−4·0
Grand mal seizures	31·2	43·2	−12·0

SUMMARY AND DISCUSSION

The fifty-six epileptic children in our main sample are below the intellectual standard of a matched control group of normal children, but not seriously so. Test score deficits range from 7·7 points in mental arithmetic to 12·2 points on verbal intelligence and psychomotor abilities. Compared with the distribution of epileptic children in Birmingham, where the survey was carried out, our sample is rather overweighted with residential school cases. If we adjusted our scores in the light of the Birmingham figures our average (composite) score would probably be about three points higher.

An analysis of the test results in more detail shows the epileptic children to be especially handicapped, in comparison with the control group, by slowness in thinking (which may be due partly to the effect of drugs, particularly the sedative drugs), immediate memory, and manual dexterity. Although they are backward, too, in numerical reasoning, they compare favourably in this respect with the control group.

The epileptic group is more heterogeneous than the control group, with about 60 per cent. more "scatter" in all tests.

Boys score higher than girls on all tests and in both the epileptic and control groups.

Dividing our main group according to type of seizure, we find that the grand mal cases score highest, with petit mal next. The cases with dual seizures, i.e. with grand mal and petit mal have the lowest scores. Their average quotients are 92·0, 83·6, and 82·7 respectively. Previous surveys have found petit mal cases to be the highest scorers.

The children with a positive family history score higher than those with a negative history, while the "Symptomatic" cases have lower scores than the rest of the group. The brain-injured children have the lowest scores of all, especially those cases with hemiplegia or quadriplegia as well as epilepsy. The average deficits of these last two groups are 15 and 30 points respectively.

Lower scores were found in the cases with an earlier onset and a longer duration of epilepsy, and also in the children with behaviour disorders. In regard to the latter it is not clear from our data which is cause and which effect, i.e.

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the behaviour or the lower mentality. The relationship between them may be reciprocal.

The grand mal cases with frequent seizures score lower than the infrequent cases in all tests, with an average deficit of 12 points (18 points on arithmetic). On the other hand the frequent petit mal cases average 11 points higher than the infrequent cases.

It is interesting that the children with *grossly* abnormal EEGs show only a minor deficit in comparison with the children whose EEGs are abnormal but not necessarily suggestive of epilepsy. In the psychomotor series the former actually score higher.

The normal schools' epileptic children score 13 points higher than those at the residential school, a result which agrees with previous findings, and which, in our survey could have been expected, since the "better" cases are, in general, retained at normal schools.

It would appear that between 60 per cent. and 80 per cent. or more of epileptic children attend normal schools, according to the area in which they live. A greater proportion of epileptic children have gone to residential schools from London and Birmingham than from most other areas, especially rural areas. Nowadays the tendency is to retain as high a proportion of epileptic children as possible in the normal schools. The Ministry of Education's Regulations 1953 (1953) state that the children who require the special educational treatment provided in the residential schools are "those pupils who, by reason of epilepsy cannot be educated in ordinary schools without detriment to the interests of themselves or other pupils". In 1954 the Minister stated (1954) "No handicapped pupil should be sent to a special school who can be satisfactorily educated in an ordinary school. Where a special school is necessary, a day school is preferable if it offers a satisfactory and practicable solution."

The Sub-Committee on the "Medical Care of Epileptics" (1956) states (p. 19) "It should be the aim of all concerned to ensure that children suffering from epilepsy are, wherever possible, educated in ordinary schools", though they also suggest "the possibility of creating additional places at existing special schools and the desirability of establishing one or two national special schools for epileptic children with other handicaps".

In our residential group 71 per cent. are below the average range of intelligence (I.Q.s 91 to 110), as against 36 per cent. in the normal schools group. Sixty-four per cent. are below this range in reading and 82 per cent. in arithmetic—against 29 per cent. and 61 per cent. respectively in the normal schools. Donovan (1952) thinks that about 40 per cent. of the epileptic children in his (residential) school would still have to be educated in E.S.N. schools if they were not epileptic.

The advantages and disadvantages of a residential school for epileptic children were ably put by the late Dr. J. Tylor Fox (1947). But if we look only at the adverse factors found in our residential group, i.e. the duality, frequency, and severity of seizures, the grossly abnormal EEGs, malbehaviour, and brain injury, as well as the lower intelligence it is evident that the staffs of residential schools are coping with a difficult problem, and it is to their credit that one of them at least manages to discharge 40 per cent. each year with fits controlled and behaviour improved, and, at the same time, endeavour to attain normal educational standards. In some of our residential cases there was an increase in seizures and a deterioration in behaviour soon after their return home.

It is clear that test scores of epileptic children are related to many factors, some of which have been mentioned. There are others, such as loss of schooling,

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the influence of drugs, anxiety, frustration, etc. If a child is unfortunate enough to have a combination of these factors, which may well happen since many of them are positively co-related, he could not be expected to compete on equal terms with others not so handicapped, and would have to receive special consideration.

Our survey shows that there is a higher incidence of behaviour disorders in epileptic than in normal children. The behaviour, like the cognitive functions, is also related to many other variables such as brain injury, sex, precipitating circumstances, grossly abnormal EEGs, type of seizure, frequent seizures, primogeniture, late milestones, longer duration of the illness, and others. These relationships indicate the complexity of the behaviour problem, and show how invidious it is to generalize about the "Epileptic Personality". Many such generalizations have been impressionistic. The present survey does not go far enough, and we must hope that others may be moved to carry out a more refined investigation on a larger sample.

As stated above, many of the epileptic variables are correlated (χ^2) with each other. Table V shows those associations which are at or near the level of statistical significance. Other notable associations have been dealt with in the appropriate sections. Table VI shows the average association of each variable with all the others, and here we find that the ones with the highest "adverse" associations are cerebral injury, dual seizures, and bad behaviour. At the other extreme are grand mal seizures, grossly abnormal EEGs, and positive history of epilepsy.

In conclusion we should draw attention to the difficulties encountered in trying to compare results of different surveys. There are many different interpretations placed on terms like "Idiopathic", "Cryptogenic", "Symptomatic", "Minor Epilepsy", and even "Epilepsy" itself. Different interpretations lead to different frequency classifications. The remedy for this confusion would be, of course, for workers to agree on a system of typology, such as that of Penfield and Jasper (1954), or some modification of it. Such a classification would entail a very thorough examination of cases, which would be beneficial from the viewpoint of treatment as well as research.

Appendix

Case-Histories of Brain-Injured Epileptics

1. P.K. (female), aged 9$\frac{1}{2}$, was the firstborn of identical twins, the other twin being normal. At the time of the birth the mother was 33 years old.

There is no history of epilepsy on either side of the family.

The birth was induced at eight months. The twins were said to have been locked and the birth, a breech one, was an instrumental one. The birth weight was three pounds. At birth the child had extensive injuries to the neck and left leg, which was stiff until the age of two.

Walking was delayed until age two. Bowel control was late.

The child had all the usual childish illnesses, including three attacks of pneumonia. During whooping cough there was a severe haemorrhage and the child had to be strapped upright for six weeks.

She was a timid child, with "inferiority feelings" and fear of the dark.

At age seven she was involved in a tramcar accident and although comparatively uninjured physically, suffered a severe emotional shock and "screamed continuously". About two weeks later seizures started. At one period the attacks—mainly akinetic—were said to be as many as fifty a day. She received many injuries as a result of these, including fractures.

At the time of testing she had been at the residential school for six months and had been free from seizures during that time. She was said to be about one year retarded and making little progress at school.

When tested she had an average quotient of 91, with a very wide range of individual scores—from 60 on arithmetic to 123 on the psychomotor series.

The EEG was "grossly abnormal".

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2. J.W. (female), aged 16 years, was a firstborn and an only child.

There is no family history of epilepsy.

According to the mother, the birth was normal, but there was some evidence—e.g. facial paralysis—of cerebral damage or abnormality. The child suffered from strabismus and her skull was asymmetrical. She had little facial expression until she was about fifteen months old, and swallowed badly. She had loss of power in both hands ("weak wrists") and was obese.

All milestones were late.

She was described as a very nervous child, afraid of noise, flames, etc. She sleep walked and had various tics. She also had a speech defect, mainly concerned with the enunciation of consonants.

At the age of four she saw her grandfather fall down and die and seizures started soon afterwards. She suffered from dual attacks at the time of the survey.

At five years old she was under observation in hospital, and was found to have a "nuclear agenesis of the sixth and seventh nerves and the fifth right cranial nerve".

The child's education started in a normal school where she graduated from the C to the B-stream in her fourth year. Her behaviour was apparently satisfactory though she had feelings of inferiority. At the age of fifteen she was transferred to the residential special school.

Her average test quotient was 59, with a range from 38 on the psychomotor series (the lowest recorded in the survey) to 86 on reading.

The EEG was normal.

3. H.P. (male), aged 14$\frac{1}{12}$, was the third child, the mother being aged 29 at his birth.

The family history was negative as to epilepsy.

Birth was premature at seven months. His twin, born after him and stillborn, was said to have been lying on him *in utero*. There was some cerebral injury at birth and the boy has a hemiplegia of the left arm and leg.

All milestones were late.

As an infant he was "highly strung", bit his clothes, and sleep-walked.

The onset of epilepsy was at one year, and was attributed to the first air raid warning! His attacks were usually severe. Just before they came on he was violent and uncontrollable but afterwards was quiet and docile. He was easily excited.

He attended normal school until the age of twelve when he was excluded from school because of his attacks and troublesome behaviour. On one occasion he attacked his father with a knife.

He was transferred to the residential school and his behaviour gradually improved and his seizures diminished. In the six months prior to testing he had been free from attacks and was returned to a normal school, where his report said that he was still free from fits but his reactions were slow. He was moody and, at times truculent, though he tried to be pleasant. His position in class was twenty-sixth out of twenty-seven.

His average quotient on tests was 84. His worst performance was on the psychomotor series with a quotient of 70. He was somewhat handicapped in this because of the hemiplegia. His best performance—95 points—was on verbal intelligence.

No information was available about the EEG.

4. A.W. (male), aged seven years, was a firstborn child, his mother being 23 at the time of the birth.

The father gave a history of seizures in infancy.

Birth was apparently normal and milestones too, but the boy was said to have been overactive and to have bitten his nails a lot.

At the age of one year he fell and damaged the back of his head, and "seemed to stare" afterwards. He was treated in hospital at the neurological unit. Six weeks later he had an epileptic attack. Following this he was free from fits until the age of four when he had another attack during measles. At the age of 4$\frac{1}{2}$ he had a seizure in the road and was knocked down by a bicycle, sustaining damage to the base of the skull, which again had to receive attention in hospital. There was an operation on the right temporal lobe.

The child attended normal school at first, where he was said to be aggressive, demanding and uncontrollable; playing up and dashing around wildly. There were "endless rows" between the parents about the boy, and he was eventually sent to the residential school.

The report there stated that he was a very difficult problem, being sadistic, with violent tempers and prone to using foul language. Later he showed some improvement in both behaviour and in class work.

He had had no seizures for more than six months.

His average test score was 67, with individual scores ranging from 50 on reading to 80 on verbal intelligence.

The EEG report was "normal or doubtful".

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References

BRADLEY, CHARLES, "Management of the Convulsive Child", *Rhode Island Med. J.*, November, 1946, **11.**

Idem, "Treatment of a Convulsive Child in a Children's Psychiatric Hospital", *The Nervous Child*, 1947, **6**, 1.

Idem, "Behaviour Disorders in Epileptic Children", *J. Amer. Med. Ass.*, June, 1951, **146**, 5.

BRIDGE, E. M., *Epilepsy and Convulsive Disorders in Children*, 1949. London: McGraw Hill.

BURT, CYRIL, *The Backward Child*, 1937. University of London Press.

Idem, *Mental and Scholastic Tests*, 1939. London: P. S. King and Sons Ltd.,

City of Birmingham Abstract of Statistics, 1953, **3**, Table 22.

COLLINS, A. LOUISE, and LENNOX, WILLIAM, "The Intelligence of 300 Private Epileptic Patients", *Res. Publ. Ass. Nerv. Ment. Dis.*, 1946, **26**, 586–603.

DELAY, J., PICHOT, P., LEMPÉRIÈRE, T., and PERSE, J., *Le Test de Rorschach et la Personnalité Épileptique*, 1955. Paris: Presses Universitaires de France.

DONOVAN, E., "The Education of the Epileptic Child", *Surrey Teacher*, October, 1952, 167.

FAIRFIELD, L., *Epilepsy*, 1954. London: Gerald Duckworth and Co. Ltd.

FOLSOM, ANGELA, "Psychological Testing in Epilepsy. I. Cognitive Function", *Epilepsia*, November, 1953, **2**, 23–26. Third series.

FOX, J. TYLOR, "Residential Schools for Epileptics in England", *The Nervous Child*, June, 1947.

FUCHS, L. L., "The Psychogenic Approach to Epilepsy", *J. Child Psychiat.*, 1947, **1**, 58–90.

Health of the School Child, 1947.

JONES, H. GWYNNE, "Experimental Studies in the Psychology of Epilepsy", *Rev. Psychol. Appl.*, 1953, **3**, 209–277.

KIMBALL, O. P., and HERSH, A. H., "The Genetics of Epilepsy", *Acta genet. med. gemellog.*, 1955, **4**, 131–142.

LENNOX, W. G., "The Petit Mal Epilepsies (Dart and Dome Dysrhythmia)", *J. Amer. Med. Ass.*, 1945, **129**, 1069–1073.

Idem, "The Heredity of Epilepsy as told by Relatives and Twins", *J. Amer. Med. Ass.*, 1951, **146**, 529–536.

Ministry of Education Circular, 276, 25 June, 1954.

MINISTRY OF HEALTH CENTRAL HEALTH SERVICES COUNCIL, *Report of the Sub-Committee on the Medical Care of Epileptics*, 1956. H.M.S.O.

PACELLA, B. C., "Behaviour Problems of Children", *Med. Clin. N. America, N.Y.*, May, 1948, **32**, 68.

PENFIELD, WILDER, and JASPER, HERBERT, *Epilepsy and the Functional Anatomy of the Human Brain*, 1954. London: J. and A. Churchill Ltd.

POND, D. A., "Psychiatric Aspects of Epilepsy in Children", *J. Ment. Sci.*, 1952, **98**, 404–410.

PRICE, JERRY, "The Epileptic Child in School", *The Ohio State Med. J.*, August 1950, **46**, 8.

PRUYSER, PAUL W., "Psychological Testing in Epilepsy. II. Personality", *Epilepsia*, November, 1953, **2**, 23–26. Third series.

Report on the Health of Birmingham, The Medical Officer of Health for Birmingham, 1953.

SANDS, HARRY, "Epileptic Child Can Lead Normal Life", *The Child*, June, 1946.

SHANKS, R. A., "The Nature of Infantile Convulsions", *Amer. J. Dis. Child.*, November, 1949, **5**, 763–774.

TENNY, J. W., "Epileptic Children in Detroit's Special School Program: A Study", *Except. Child.*, February, 1955, **21**, 5.

The School Health Service and Handicapped Pupils Regulations, 1953. Regulation 14.

ZIMMERMAN, F. T., BURGERMEISTER, B. B.. and PUTNAM, T. J., "Intellectual and Emotional Make-Up of the Epileptic", *Arch. Neurol. and Psychiat.*, May, 1951, **65**, 5, 545.

https://doi.org/10.1192/bjp.103.430.28 Published online by Cambridge University Press