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THE CLINICAL AND ACADEMIC CORRELATES OF A PERCEPTUAL TRAINING PROGRAMME FOR GRADE I CHILDREN

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Johannesburg 1975.

I hereby declare that this dissertation is my own work and that I have not submitted it for a Master's Degree to any other University

L. ZIMBLER

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ABSTRACT

A training programme aimed at the motor, perceptual, conceptual and social bases of learning was devised, in order to determine whether administration of such a programme could enhance these areas of functioning in Grade I children. Two groups of children were chosen: low socio-economic children and high socio-economic children. The experimental and control groups comprised two subgroups each: a high socio-economic sub-group and a low socio-economic sub-group. The same battery of tests assessing the motor, perceptual, conceptual and social functioning of all the children was administered before and after the training programme, which was run for the experimental group only. The comparison of before-after scores was achieved by means of analysis of variance and analysis of covariance. The results indicated that such a training programme could be successfully administered by the Grade I teacher. The results indicated further that all children subjected to the training programme improved in the areas of tactile discrimination, auditory discrimination, visual-motor co-ordination, visual discrimination, language development and verbal fluency and conceptual development. When children of high socio-economic status were compared with those of low socio-economic status differences in the quality and quantity of improvement emerged. On school entry, the latter lagged behind the former in the abovementioned areas, as well as in maturity level and reading readiness. Those of low socio-economic standing showed most sensitivity to training in the tactile discrimination, visual-motor, language development and verbal fluency, social maturity and reading readiness areas. Although these children showed increased rates of improvement in these areas when compared with their high socio-economic counterparts, a ten-week programme was insufficient to bridge the gap between the groups. In view of this finding, it was suggested that the socio-economic variable be more closely heeded in future diagnosis of learning disability.

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CHAPTER I

I.I Overview

In the not too distant past, the child who failed to cope at school and at home despite the fact that he was not obviously physically or mentally handicapped was regarded as "naughty", "lazy", "stubborn", "a nuisance", etc. and treated accordingly. Then, in I94I, Werner and Strauss introduced the concept of "the brain injured child", which suggested that the problems of these children went deeper than mere naughtiness and laziness.

In their now classical work "Psychopathology and Education of the Brain Injured Child" (I947), Strauss and Lehtinen first distinguished between the "exogenous" and the "endogenous" retarded children. The latter were classified as those for whom there was no history of perinatal, or childhood nervous system damage. The former gave evidence of risk or insult to the central nervous system. Comparison of the two groups revealed that, despite some overlap, the children in the exogenous group were more hyperactive, more perceptually disordered, more distractible and emotionally more labile than those in the endogenous group. It was to children showing these unusual patterns of behavioural organisation that the term "brain injured" came to be applied. However, it is now apparent that the classic description of the "brain injured child" pertains only to a segment of the total group currently under consideration. The problem of defining this larger group has become a thorny issue, and will be dealt with later in this exposition.

Since the I940s, research into, and theorizing about the lot of these children has steadily escalated until today they have achieved "scientific" status. Books and journal articles are written about them. Interest in their problems is shared by the fields of general medicine, psychology, special education, neurology, and psychiatry.

As the problem has captured the interest of increasing numbers of professionals and researchers in an increasing number of fields, so the existing theories have proved increasingly inadequate and have

come to be treated more as working hypotheses. At present there appears to be no one theory which can unequivocally encompass all the research findings. One such attempt was made by Wender (I97I). He believes that these children "constitute a large fraction of the more seriously disturbed population of children", and as such, require much more intensive and focussed research than they have enjoyed to date.

I.2 Rationale of the study

In America and England, special educational programmes have been devoted to these children. In this country, their plight has only recently been recognized and there is still a dearth of facilities catering for their special needs.

At the commencement of this study, a few schools in the Transvaal had introduced remedial programmes into their Grade I curriculae. Choice of programme and period over which the programme was run were far from uniform. Programmes ranged from those drawn up by Frostig and Horne (I964) to home-made programmes, to bits and pieces drawn from a number of sources in the remedial literature. A survey of the manner in which the need for remedial education was assessed, and remedial programmes then introduced, revealed it to be far from systematic or satisfactory. The present study attempts to systematise the remedial task within the school setting.

The remedial task itself has received different emphases in the literature. Some investigators assess the child's pattern of development through diagnostic testing. The low points in the profile then become the major remedial targets (Cruickshank et al I96I; Sapir, I97I). Others emphasise particular developmental areas felt to be crucial to the difficulties experienced by the MBD child. Perceptual-motor problems are the usual focus of these workers (Cruickshank et al I957; Frostig and Horne, I964; Strauss and Kephart, I955). Still others concentrate on deficits in motor skills and co-ordination, regarding them as highly important in the child's total development (Delacato, I966; Kephart, I956). Johnson and Myklebust (I967) emphasise language disorders and stress the importance of a thorough language therapy programme. Other workers in the field devote their attention to those

behavioural characteristics of poor attention and hyperactivity that interfere with constructive learning. These workers generally employ behaviour modification strategies (MacKenzie et al 1968; Wadsworth,1971).

An overview of all these approaches reveals them to be piecemeal. It is a fundamental postulate of this study that the child needs to be dealt with in a holistic fashion.

As early as 1955, Strauss and Kephart had noted the importance of focussing on the whole individual:

> ...scientific research has indicated more and more that this organism operates as a whole, and that we must give increasing attention to the disturbances which are a product of the disruption of the total functioning of the organism rather than concentrate our attention upon the part or parts ...we must consider the totality of the organism and the functional integration... not only within the parts themselves, but also between the parts leading to the unique functional possibilities which develop from the characteristics of the whole.
>
> (p.1)

Thus a relevant remedial programme must include as many techniques and strategies and foci (in a flexible matrix) as are necessary to provide for the total gestalt. Bearing in mind the practical implications of the various psychological theories and models discussed in Chapter 3, (e.g. the principles and practice of behaviour modification; the importance of establishing the perceptual and motor bases of learning before proceeding to the cognitive and linguistic levels; the necessity for establishing deficits and strengths, and then planning an individual programme to accommodate these; the careful attention to both the process and the content of learning; attending to basic figure-ground skills; accommodating intersensory integration etc.), and bearing in mind the holistic postulate, a remedial programme was drawn up. This programme was based on the principle that the child's own activity is vitally important in the learning process. The programme follows closely the natural development of the child in the following spheres; academic, social, emotional, motoric, cognitive, linguistic and physiological (Gesell,1941; Holt,1964; Inhelder,1971; Isaacs,1950; Piaget,1950, 1955, 1969, 1970, Phillips,1969; Sigel,1969).

As children's abilities develop in a progressive and sequential manner, as a result of both maturation and experience, a healthy and stimulating early environment (i.e. one that presents the child with appropriate experiences at the appropriate times for the child's current maturational and experiential status) is vitally important. Before the child can succeed in learning the elementary school subjects, reading, writing and arithmetic, much prior preparation and development must have taken place. Ismail and Gruber (I967) working with elementary school children in the USA, showed that overall motor co-ordination is significantly related to academic success. Factors like balance, laterality, and gross muscle co-ordination were the effective variables in relation to learning. Motor integration and physical development are basic to much later learning - without minimal physical skills and strength, the child cannot cope adequately with, or explore, his environment in the way that Piaget and his followers (Inhelder,I97I; Phillips,I969) showed to be the forerunner of conceptual ability. The development of tactile discrimination requires extended physical skills, and is an index of the child's ability to learn and understand through feeling and elementary sensory association (Fernald, I943; Montessori,I965). The ability to hear properly and to respond appropriately to complex sounds and instructions depend on the adequacy of auditory discrimination. Once visuo-motor co-ordination develops, the child has increased resources with which to solve the problems posed by the everyday environment. Visual discrimination improves naturally as a result of both neurophysiological growth and visual experiences. The refinement of such visual skills as noting the fundamental differences between the various objects and symbols is essential to more advanced symbolic learning such as reading. Language development and verbal fluency can be enhanced by many preparatory experiences basic to all communication (Valett,I966). The child's early conceptual development depends on the appropriate integration of all developmental tasks so that a meaningful picture of the environment emerges - a picture in which objects and symbols are related. Once a growing awareness of the basic relationship and groupings is established, the child is then able to tackle the solution of more advanced problems such as those posed by the Piagetian conservation experiments.

Thus, the present training programme covers the following areas:

I. Motor integration and physical development
2. Tactile discrimination
3. Auditory discrimination
4. Visuo-motor co-ordination
5. Visual discrimination
6. Language development and verbal fluency
7. Conceptual development
8. Social co-operation and interaction

Where a child reveals fixation at a certain developmental point, exercises are introduced which are graded in such a way as to lead the child gradually back to the developmental path trodden by his contemporaries. This comprehensive training model includes the presentation of concepts and skills, response and practice opportunities, and reinforcement and/or correction procedures. Also built in to this training process is continuous review of the child's progress. According to the systems analysis approach (Emery and Trist, 1970), the human being is an open-system (i.e. in constant dynamic interaction with the manifold aspects of the outer environment). In order to adapt successfully to this ever-changing environment, appropriate feedback is vital. Feedback has three aspects:

I. the purveyor of feedback, (in this case, the teacher),
2. the quality of the channels through which the feedback flows within an individual and
3. the quality of the mechanisms which then interpret the feedback and alter the individual's behaviour accordingly.

In this training programme, close attention is given to all three.

The training programme thus provides

I. a curriculum which enriches the learning environment for all Grade I children while simultaneously
2. allowing individualized teaching for each child's specific area of dysfunction, by

3. simplifying or postponing some of the curriculum content and
4. using small amounts of materials at a time, frequent changes of activity and by allowing freedom to move about, as well as
5. making use of a variety of methods and materials in order to present the material to be learned to as many different modalities as possible and so
6. provide a firmly structured routine with specific regulations regarding movement, speech, work and social relations.
7. By continuous review of the pupil's progress,
8. the programme further provides for immediate feedback to the scholar which, in turn, makes for increased attentiveness to the task, and increased mastery of the learning environment.

In addition, the programme was devised to be administrable by any teacher to any Grade I class. (See the Appendix for the programme.)

I.3 A programme administrable by any teacher to any Grade I Class

As McCarthy (1973) points out:

> There are too many children with specific learning disabilities to be diagnosed or taught by trained specialists. The only people present in the public schools in sufficient numbers to make a dent in the unknown number of children with MBD are the regular classroom teachers. (p. 363)

In other words, there are not enough specialists to cope with the problem at the present time. That it is a widespread problem, and that it may be the precursor of a whole range of further problems, is clear. (See Chapter 3). An immediate, practical solution to the problem is to make use of those people most influential in the earliest years of formal education and reaching the greatest number of children. Such an approach is in line with preventive community care. The Community Mental Health approach of Caplan (1961) distinguishes between Primary- Secondary- and Tertiary Prevention. Secondary and tertiary prevention are concerned with already existing disorders. Primary prevention refers to the process involved in reducing the probability that community members will succumb to the disorders which are the concern of secondary- and tertiary prevention.

Also in line with the Community Mental Health approach is the concept of using key figures in the community to promote the mental well-being and potential of those persons who are directly influenced by them. The Grade I teacher is one such key figure in the community. The pragmatic value of a preventive approach lies in the fact that "preventive programmes do not have to be deferred until clear, scientifically validated proof of the etiology of an illness is available" (I96I, p.II). A carefully briefed teacher, armed with a concise and comprehensive training programme may be as effective a preventive agent as a mental health officer. A study by Haring and Ridgeway (I967) confirmed the teacher's key role in the early identification of children with learning disabilities. Caplan comments that the importance of the teacher in the emotional life of the scholar increases tremendously when the scholar is faced by a crisis. Most children with learning disabilities are faced by what may be termed a "crisis of adaptation". It is at this stage that the supportive or unhelpful activities of the teacher may be instrumental in tipping the child towards or away from a healthy, adaptive solution to the problems facing him. The usual state of affairs is that the child is in marked difficulties before community agencies come into play. As the school is most often the first social institution to note inadequate intellectual and/or emotional development, it is the institution most strategically located to do something about it. As Piaget (I962) comments:

> ... it is not the child that should be blamed for the eventual conflicts, but the school, unaware as it is of the use it could make of the child's spontaneous development ...
> (p. II)

In this setting then, primary prevention encompasses those actions that maximise the social forces within the school community which tend to encourage the full development of the child as a rational, creative and self-actualizing being. Dykman et al (I973) comment:

> We believe that a child who is diagnosed MBD at age IO-I2 is more apt to carry the scar at age I4 than a child who is diagnosed MBD at age 8-IO or younger ... a child who is still MBD or learning disabled at age II carries a poorer prognosis.
> (p. IO7)

Grade I is the beginning of the formal, academic training of the child. As such it is crucial to the mental well-being and potential of the child to optimise the experiences that he/she has.

The training programme u.ilised in this study makes use of the teacher as the key figure implementing a training programme designed to detect and remedy as far as possible, and within the everyday environment of the child, possible learning disabilities at an early stage in the educational process. Further, the programme aims at exercising and strengthening the motor, perceptual and perceptual-motor bases of all future learning of all scholars.

De Hirsch (I973) writes

> As regards perceptuo-motor training, young children, especially those with atypical central nervous system functioning, can only benefit from it, since touch, smells, sounds, forms, shapes and textures are the very stuff of living ... Body image work is particularly useful as a means of orientating the children in space. (p. I59)

Denhoff (I973) writes

> I feel very strongly from our studies of the preschool MBD group that if one concentrated not on reading, writing and arithmetic, but on the precursors of education, such as body awareness and perception and language problems ... the long-term outcome of this group would be greatly modified. (p. 205)

Frostig and Horne (I964) believe that

> ... perceptual training should be given as early as possible, both as part of the regular curriculum and especially whenever perceptual disabilities are known or suspected. (p. I7)

Wender (I97I) points out that

> Too often, by the time his disability is recognised and treated, the MBD child has fallen behind in many subjects. Learning problems are cumulative. (p. I6)

Valett (1966) and Kephart (1968) point out that by solidifying the developmental foundations underlying learning, it should be possible to prevent many later academic problems. By the same token, it should be possible to prevent the many later social-emotional problems that occur in conjunction with academic problems by attacking their antecedents as early as possible.

The act of solidifying the developmental foundations underlying learning may also be regarded as an act of environmental enrichment. When a child enters the school system it is necessary to ensure that the required stages of development have been adequately established. The curriculum usually assumes that the child has reached the sensori-motor and perceptual-conceptual stages when he enters the school system. This assumption is not always correct. Some children will have reached these stages through normal maturation and development. Others who lagged behind their contemporaries might have caught up at nursery school if the nursery school attended to perceptual and motor training. However, not all nursery schools do and not all children attend nursery school. Many children come from stimulus- deprived homes where there is very little opportunity to develop motorically, perceptually and conceptually. Those children who are at the motoric- perceptual- and conceptual stages relevant for the beginning of academic training may benefit from a consolidation of these stages. Those who have not yet attained these stages will probably benefit from an opportunity to learn and practice the required skills and operations. By attending to the basic learning processes in all children then, the school can ensure that academic progress will be as rapid as possible, as efficient as possible, and as meaningful as possible.

CHAPTER 2

2.I History and development of the problem

The pioneering work in this area was done by Werner and Strauss in the late I930's and early I940's. They were the first to note commonalities among children who had previously fallen into such disparate categories as mentally retarded, emotionally disturbed, autistic, behaviourally maladjusted and aphasic. These commonalities in the behaviour and learning patterns of these children were hypothesised to be manifestations of brain injury, hence the new classification "brain-injured children". The brain-injured child was defined as follows

> The brain-injured child is the child who before, during or after birth has received an injury to or suffered an infection of the brain. As a result of such organic impairment, defects of the neuromotor system may be present or absent; however, such a child may show disturbances in perception, thinking, and emotional behaviour, either separately or in combination. This disturbance can be demonstrated by specific tests. These disturbances prevent or impede a normal learning process. Special educational methods have been devised to remedy these specific handicaps.
>
> (I947,p.4)

It was at this time that the distinction between "exogenous" and "endogenous" brain injury was drawn. The children to whom the new term came to be applied were those with exogenous injury i.e. their impairment was not due to an inherited pattern or to the genetic make-up of the brain. Strauss then demonstrated how the pattern characteristic of the exogenous child, i.e. disturbances in perception, concept formation and in emotional behaviour, could also manifest in children whose overall intelligence fell within the normal range. This demonstration was done by means of the special tests which are described in the early work. It was Strauss too, who first stressed the difficulty in figure-ground discrimination experienced by many of these children. Strauss attributed to this difficulty the cause for the hyperactive and distractible behaviour characteristic of so many of the children. In the second part of the early work "Psychopathology and Education of the Brain Injured Child", Lehtinen presented, for the

first time, general principles in the education of these children. She also provided suggestions for reducing hyperactivity and distractibility during school hours, e.g. the learning environment was to be designed to reduce distraction and hyperactivity, and special materials were to be constructed to aid the child in the perception of visual forms and in the organization of space and form. As early as I939, Werner and Strauss had advocated the use of "functional analysis" through which is ascertained how a child achieves a particular test score. Together with the emphasis on functional analysis went the insistence that each child be assessed in terms of his particular abilities and disabilities. These formulations were adopted by Lehtinen and still form the basis of much remedial work today.

A number of the early experiments conducted by Werner, Strauss and their colleagues dealt with perceptual and perceptual-motor functions (Werner and Strauss , I94I). The results of these experiments led them to postulate that the disorganised patterns of behaviour reflected a basic visuo-motor impairment. They ther experimented further with an auditory-motor task, and were led to conclude that exogenous children suffered from a general impairment across a number of sensory modalities (Werner and Bowers, I94I).

Soon after Strauss and Lehtinen published their volume, their assumptions and the implications of their work were questioned. The terminology in particular caused much confusion. Some brain-injured children e.g. many with cerebral palsy, had no learning disorders, while other brain-injured children evinced severe mental deficiency. Stevens and Birch (I957) summarised the terminological objections as follows:

I. The term "brain-injured" has etiological implications. It makes no reference to the behavioural aspects of the syndrome, yet the condition of brain injury is described in terms of syptoms and not in terms of causes.
2. The term may be associated with conditions like cerebral palsy and epilepsy, which bear no relation to the kind of child under consideration.

3. The term "brain-injured" has unfavourable and unfortunate connotations as far as parents, educationists, physicians and others are concerned.
4. The term is not specific enough; it is too broad in meaning and thus lends itself to oversimplification. In fact, Wortis (1956) pointed out

> There is no "brain-injured child", but only a variety of brain-injured children whose problems are quite varied and whose condition calls for far more refined analysis than some of the current generalizations on the brain injured child provide.
>
> (p.63)

Thus, in 1957 Stevens and Birch recommended that the term "Strauss syndrome" replace the old classification. Other workers in the field chose different terminology, e.g. Doll (1951) suggested "neurophrenia" while others favoured "perceptually handicapped". Some researchers pointed out that children manifesting the Strauss syndrome were only a portion of the children with learning problems e.g. some children with learning difficulties exhibited not hyperactivity by hypoactivity. Furthermore, not all children with learning difficulties exhibited perceptual disturbances. Clements (1966) and others coined the terms "minimal brain dysfunction" and "minimal neurological impairment". They preferred to place children with various brain impairments along a scale ranging from mild to severe. At the severe end children with obvious brain damage were to be placed. At the opposite end children with minimal impairments that affect behaviour and learning in subtle ways were to be placed. Chalfant and Scheffelin (1969) chose the term "central processing dysfunctions" and focussed on disorders in the analysis, storage, synthesis and symbolic use of information. As the diagnosis of the condition is made in terms of behavioural symptoms, Kirk (1963) suggested the term "learning disabilities" to describe children who had disorders in the development of language, speech, reading and associated communication skills prerequisite for social interaction. Excluded from this category were children with sensory handicaps such as blindness and deafness, children with generalized mental retardation and children whose learning failure was primarily associated with emotional disturbances. Johnson and Myklebust (1967) modified Kirk's term and it became "psychoneurological learning

disabilities". This t m highlights a concern with the learning process and educatio hese children, while acknowledging that there may be impairment f the central nervous system.

Reitan and Tannhauser, at the 1965 "Seminar on Brain-Injured Children" made their contribution to the terminological issue. Reitan postulated the need for definitions on many levels but simultaneously recognized that each level-definition would be inadequate when viewed from the other levels. Thus no one definition could adequately cover the field. Tannhauser similarly postulated the need for a definition for each of three levels:

(a) etiology, (b) classification and administration and (c) education.

However, she failed to spell this out any further. At this historically important Seminar, the general emphasis was on an exclusively behavioural definition which would be of educational relevance. Hallahan and Cruickshank (1973) report that a survey of the literature between 1960 and 1965 reveals a downward trend in the concern with etiology and a corresponding upward trend in the concern with definition. To date, the problem of definition still remains one of the thorniest issues to be faced by the field.

To return to the broader field, the contributions of Newell Kephart are important steps in the evolution of the problem and its remediation. He collaborated with Strauss on the second volume of "Psychopathology and education of the brain-injured child" (1955). This book incorporated a discussion of the brain injured child of normal intelligence. Even more significant to the field of learning disabilities per se was Kephart's "The slow learner inthe classroom" (1960). Here he includes both a theoretical dis course on children with perceptuo-motor problems and techniques for remedial teaching. The perceptuo-motor facet of child development is vitally important for Kephart. He believes that laterality must be established before the child can differentiate left from right (i.e. directionality) in space. The child who fails to establish laterality, will not establish directionality and therefore will not, in Kephart's view, be able to distinguish between such stimuli as "b" and "d". Also linked to Kephart's laterality-directionality hypothesis is his formulation that motor and kinaesthetic development precede visual development. He

based his training activities upon the concept which was most basic to him: the perceptual-motor match.

In I956, Kephart collaborated with the optometrist, Gerald Getman, on a book dealing with various aspects of perceptual motor development and training. Then, in I964 Getman, Kane, Halgren and McKee produced "The physiology of readiness" in which they not only described basic perceptual motor training activities but also set forth several premises subsequently adopted by many workers in the field of learning disabilities:

I. Academic performance in today's schools depends heavily upon form and symbol recognition and interpretation.
2. There are perceptual skills which can be developed and trained.
3. The development of perceptual skill is related to the levels of co-ordinations of the body systems, i.e. the better the co-ordinations of the body parts and body system, the better the prospects are for developing perception of forms and symbols.
4. The child whose perceptual skills have been developed and extended is the child who is free to profit from instruction and to learn independently. The greater the development of the perceptual skills, the greater the capacity for making learning more effective.

(p. iii)

During the I960s, Frostig presented "The Marianne Frostig Developmental Test of Visual Perception" (Frostig, Lefever, and Whittlesey, I96I; Frostig, Maslow, Lefever and Whittlesey, I964). Together with Horne (I964), she then developed the well-known training programme to develop and remediate visual and visuo-motor abilities as assessed by her test. Although this test has been subject to many methodological criticisms since its inception, in an historical perspective, it represents the first attempt to differentiate out the various components of visual perception. It is also the forerunner of many later attempts to assess perceptual motor abilities rather than conceptual, intellectual functioning, as was the test-norm for children prior to the work of Frostig et al.

It should be noted that Kephart, Getman and Frostig all assume

that perceptual development is a forerunner of conceptual development, and that without the proper development of the former, the latter will be adversely affected. In this assumption, all three concur with Piaget. Furthermore, all three stress that motor development precedes, and is necessary for, adequate perceptual development. This formulation was to be questioned in the I960s and I970s by Cratty,(I970); Ayres, (I965), Smith(I966); Fleishman et al (I96I) and Bloom,(I964), whose work, though not conclusive, and not unequivocal, challenges the assertion that motor learning influences perceptual processes. Kephart, Getman and Frostig also draw attention to the need to diagnose a child's particular problem before applying specific remedial techniques. All three share common ground too, in their de-emphasis of etiology. While the problem of central nervous system damage still occupies some authors, many others have turned their attention to the construction of educational programmes based on behavioural correlates.

Doman and Delacato were concerned with treating central nervous system damage. They began developing their theory of "neurological organization" in the late I950s. Their treatment procedures were popularly accepted by the general public, but their professional colleagues brought heavy guns to bear on their assumptions and formulations. The heated controversy which surrounded their theory and research acted historically as an impetus to the whole field of learning disabilities to clarify and re-examine itself. Hallahan and Cruickshank (I973) even suggest that the controversy had some bearing on the transition from the concern with etiology (as evidenced by such labels as "brain injured" and "minimally brain injured") to the concern with behavioural patterns (as evidenced by the term "learning disabled"):

> The rejection of the neurological organization educational methods, owing to their proponents' claim of direct brain training, may well have motivated interest in the discovery of educational methods based strictly upon learning abilities and disabilities ... (p. I00)

As regards language disability, the majority of theorists and researchers tended to pay little attention to communication skills, just as Werner and Strauss had paid little attention in the early years

to language problems. Then, in I952, Katrina de Hirsch focussed attention on the frequent association between visual-motor problems, and language deficiencies. Drawing from the work of Werner and Strauss, de Hirsch investigated the perceptual-motor dysfunctions of this group of children with language difficulties: their spatial disorientation, their visuo-motor and figure-ground problems, their hyperactivity and their primitive motility patterning. She observed that most children with severe language disabilities, like Strauss and Lehtinen's (I947) brain-injured subjects, were not only hyperactive, but distractible, uninhibited and disorganized.

Like Bender (I956), she regarded these as manifestations of central nervous system dysfunction, or as developmental or maturational lags. de Hirsch's remedial endeavours are based on her belief that there can be no one specific approach to remediation and on her focus upon the child rather than upon the method. In I963, she investigated the complex interaction between linguistic disturbances and psychopathology. Studying two groups of adolescents, both manifesting severe learning disabilities, she found that for one group, academic failure was just one aspect of severe ego impairment and a reflection of a schizoid disorder. In the other group, scholastic difficulties were related to a residual language deficit which had resulted in damage to the child's self-image and a total rejection of academic goals. Like Kephart, Getman and Frostig, de Hirsch emphasizes that for those reading disabled children, perceptuo-motor and oral language education must precede formal reading instruction.

In a discussion of "Communication Disorders in Brain Damaged Children" (I967), Pond suggested that speech is one of the "species-specific signals that does not get developed unless the earliest stages of the child's relationships are smooth enough to pave the way for the exploration of the 'other' outside", (p. 5I). He suggested that all that could be said about the etiological problem at that time was that there may be an underlying disturbance in maturation which could manifest itself in a large number of ways.

Another significant figure in the field of learning disabilities who focussed attention on communication disorders, was Samuel Kirk.

It was he and his associates who put out the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy and Kirk, 1968). This test is regarded as the primary clinical and research tool identified with the field of learning disabilities. According to its authors, the test was to be used to diagnose psycholinguistic abilities and disabilities and so pinpoint specifically the cause of any number of academic problems. Since the publication, much research has focussed on the test itself. There are still many aspects which need to be refined e.g. validity, reliability, the discreteness of the abilities which the subtests purport to measure, etc. It is generally recommended that the test be used as one of a battery to assess problems and to draw up remedial recommendations. Kirk has not focussed only on psycholinguistic abilities. Within the subtests are a number of items concerned with visuo-motor functioning too.

Whereas Kirk combined an interest in language and perceptual-motor behaviour, another major figure in the field, Helmer Myklebust concerned himself with lingual disabilities. Together with Doris Johnson, he identified five major types of learning disabilities- auditory, language, arithmetic, reading, writing and nonverbal (Johnson and Myklebust, 1970) and set up recommendations for their diagnosis and remediation. It was Myklebust who proposed the concepts "psycho-neurological learning disability" and "learning quotient". The former concept underscores his persistent interest in "the relationship between brain and behaviour" (1970, p.112). He is one of the theorists who postulates neurological dysfunction at the base of all learning disablilties. The latter concept, "learning quotient" represents the first attmept to quantify the extent of a child's learning disabilities by comparing his expected potential with his actual performance.

The most notable workers within the neurological dysfunction realm are Benton and Reitan. While accepting the hypothesis that learning disabilities are the result of multiple determinants, Arthur Benton chose to tease out the neuropsychological correlates of educational failure. He conducted much research on right-left discrimination ability and various aspects of body schema. After reviewing the literature, Benton (1968) concluded that right-left discrimination ability did not relate to reading ability. This conclusion is contrary to

Kephart's (I960) statement that the discrimination of right from left should affect academic achievement. In the area of test construction, Benton (I963) devised a test for the diagnosis of brain damage using a memory-for-designs format: the Benton Visual Retention Test. As is the case with so many of the tests in this field, this particular test is subject to a number of methodological criticisms.

The other eminent worker within the neuropsychological domain is Ralph Reitan. He developed test batteries to measure a much broader variety of abilities than those assessed by Benton's test. In I955 he published the Reitan-Indiana Neuropsychological Test Battery for Children, and this battery has been used in the investigation of a wide variety of psychological abilities and their association with brain damage. Much research has focussed on the relationship between localization of the lesion and the corresponding affected function, but nothing conclusive or unequivocal has yet emerged.

The neuropsychological work, taken as a whole, is still in its infancy. Much of the research is beset by methodological obstacles. In addition, neurological measures such as the EEG and methods for pinpointing lesions are still being refined and elaborated. When the lesion has been sustained prenatally, paranatally or postnatally, as is postulated for learning disabled children the task of locating the lesion increases a hundredfold in complexity. As far as studying brain damage in children is concerned, research findings are most often inconclusive or contradictory. This may be accountable for in part by factors related to the developing child's brain and to the inconsistency with which new behaviours are manifested until such time as they are firmly established. Furthermore, the group of children classed together as "brain damaged" is far from homogenous with respect to extent, location and age at onset of the lesion. In the light of all these difficulties, it is not surprising that little of educational relevance has emerged from these researchers.

To date, there has been little cross-fertilization of ideas between the education-orientated and the neuropsychologically oriented researchers. William Gaddes (I968) has been one of the very few proponents of the inclusion of a neuropsychological approach in the overall

diagnosis and education of learning disabled children. This suggestion is far from unreasonable, as neurological data could contribute meaningfully to diagnostic understanding and to predictions about achievement potential.

Cog[illegible] of the methodological problems besetting the diagnosis of brain dam[illegible]. Deutsch and Schumer, (I967) decided to abandon the orthodox approach to testing and construct an instrument instead to measure behaviours crucial to the particular hypotheses under study. In this way they hoped to free themselves of the bonds imposed by single already-extant tests. They then applied themselves to brain-behaviour investigations based on Birch and Lefford's (I963, I964) work on sensory integration. In I965 Birch and Belmont had found that central nervous system damage delays intersensory integration. More specifically, they found that retarded readers were characterised by faulty auditory-visual integration. Deutsch and Schumer applied themselves to the task of assessing problems in intersensory integration as related to brain damage, and to constructing tests relevant to their research hypotheses. Their approach certainly forestalled many of the usual criticisms of those sceptical about brain behaviour research. In addition, their focus on the learning process in terms of stimulus input makes their research eminently acceptable to educationalists. Their break from the conventional approach of using single-score intellectual and achievement measures and their decision to investigate specific abilities and their interrelatedness have opened new doors in the field of learning disabilities.

To date, research contributions to the field of learning disabilities continue to pour in en masse, and from many different countries. Hallahan and Cruickshank (I973) note that

> Such growth never has been experienced by any other discipline within special education in such a short period of time. ... The astounding growth of this field of childhood education has not been without its problems, nor has it yet resulted to any significant degree in either national or local programmes of quality.
>
> (p. I)

2.2 The development of remedial programmes

As early as I932, Monroe had emphasized the need for developing a profile of deficiencies before undertaking any remediation. Once this was established, she set about training all children in auditory discrimination and then gradually teaching them to associate sounds with their visual equivalents. Her assumption was that an auditory approach was applicable to all children with learning difficulties. In later years, it became evident, however, that a considerable number of children falling into this category do not have deficiencies in auditory learning, and for these children Monroe's procedures are inappropriate.

Fernald (I943) viewed the problem quite differently. She assumed that there was a deficit in visual learning and therefore developed a method to teach children visually. In the first stage of her remedial programme the child was required to trace with the finger, as the tactile modality was considered primary. In stage two the child was required to auditorize the word while writing it, so that eventually the word would be recognized from the visual stimulus alone. Fernald felt that the approach was to establish more effective visual learning through the tactile-auditory modalities. However, this approach does not take into account those children with deficits in tactile learning, auditorization and visual learning.

In I966, Clements commented

> We cannot afford the luxury of waiting until causes can be unquestionably established by techniques yet to be developed. We cannot postpone managing as effectively as possible the large numbers of children who present chronic differences we feel are more related to organicity variables than others.
>
> (p. I)

This statement reflects the growing sense of urgency in meeting the needs of these children in the past two decades. Spurred on by this sense of urgency, Cruickshank et al (I96I) published an account of an early demonstration pilot study aimed at investigating and

assessing the usefulness of teaching methods developed for brain injured children, and to evaluate their applicability to hyperactive and emotionally disturbed children with no evidence of brain injury. The early work of Strauss and Lehtinen (I947) provided the foundation for these teaching methods, as did Cruickshank's (I95I) earlier work on perception in cerebral palsy. This demonstration-pilot study incorporated the following factors:

I. the reduction of both environmental space and distracting visual and auditory stimuli,
2. the structuring of a daily routine in such a way that each child knew what was expected of him,
3. an increase in the stimulus value of the instructional materials,
4. a means whereby the teacher came to know the strengths and weaknesses of each child.

An instruction programme was then tailored to each child's individual needs. The programme included tasks designed to develop fine muscular control, eye-hand co-ordination, form perception and perception of figure-ground relationships. Each child was introduced to work in which he was able to succeed and then led, by planned stages, through more difficult tasks. Each step was tested for mastery before proceeding to the next. All approaches to learning were utilised: auditory, visual, kinaesthetic and tactile.

Although the results of this study proved inconclusive, its methods and strategies were adopted by many later workers.

A number of experimental schools were established in the U.S.A. in the I960s. Strother (I963) reported on the principles followed by one such school set up under the auspices of the University of Washington, Seattle. The need was stressed for a systematic inventory of the child's level of development in perception and motor functions, in communication, in concept formation and in social interaction. On the basis of this information, the following fundamental principles emerged:

I. learning sequences should be broken down into small successive steps, which
2. should be arranged and presented so that the child responds successfully.
3. Whenever a child experiences difficulty, the teacher should modify the step to make it easier for the child, and
4. these children require more practice to learn a given step. and more frequent review to retain it than is necessary for normal children.

Like Strauss and his followers, Strother believes that these children need not only structured physical space in which to learn, but also structured learning programmes. This emphasis on structure and carefully programmed conditioning characterises most American schools for the "brain-injured" child.

Frostig based much of her remedial teaching on her programme for the development of visual perception. She and her colleagues developed this programme for the development of visual perception in the five areas assessed by the Frostig Developmental Test of Visual Perception (I964). A major part of the work books involve graded paper and pencil tasks, although Frostig insists that sensori-motor training should precede and accompany perceptual training through work books. She believes that the ability to perceive spatial relationships develops from the earlier ability to perceive the position of an object in relation to onds own body and so includes many graded exercises to develop body image, body concept and body schema. Underlying all this work is the principle that the child's own activity is the most important basis for perceptual development.

This principle similarly underlies the remedial programmes expounded by Kephart (I960). He developed series of exercies which strengthen visuo-motor skills. The concept of "readiness" is stressed and he has developed means of fostering it in slow learners. He comments:

Teaching should be directed toward the total activity of

> the child in any given task. The total activity includes all four processes: input, integration, output and feedback. If any of these processes are deficient, the child may be expected to experience difficulty ... The too frequent dichotomy between muscular or motor activities and intellectual activities becomes untenable. Since we cannot separate the perceptual and the motor in the processes of the child, we should not attempt to separate them in teaching him.
>
> (I960, p. 4)

The remedial programmes of both Frostig and Kephart have found wide favour amongst those concerned with the education of learning disabled children.

In I967 Johnson and Myklebust put forward a highly comprehensive remedial programme, after finding that

> ...existing special education programmes are inadequate... in order to learn to the best of his ability, a child with a learning disability must have an inclusive special education programme...for maximum benefits to be realized, the effort must be made at as early an age as possible.
>
> (p. 49 - 50)

Johnson and Myklebust preface their exposition with the warning that children with learning disabilities form a heterogenous group. The wide range of learning disorders found in this group requires a diversity of approaches and techniques of both diagnosis and remediation. They therefore propose a multi-dimensional approach.

Borrowing from the work of Birch (I964) and Zigmond (I966), Johnson and Myklebust emphasize that these children require material to be presented in a modified manner, because perceptual organization and integration differ in children with learning disabilities. Like Monroe (I932) they point out the importance of establishing a profile of deficiencies. Unlike Monroe, they then proceed to plan remedial programmes based on the child's specific profile of <u>strengths and weaknesses</u>. Unlike Fernald, Strauss and Lehtinen, Cruickshank, Kephart and Frostig, who see perceptual processes at the root of all learning disturbances, Johnson and Myklebust believe that the learning disabled child cannot be viewed solely in terms of perceptual disturbances. Not all have such disturbances and when such disturbances are

in fact present, they might include auditory or tactile processes as well as, or instead of, visual processes.

Johnson and Myklebust believe further, that the most successful remedial principles are those based on both psychological and neurological foundations:

I. Teaching of children with learning disabilities must be individualized. The remediator must have as comprehensive a view of the total child and his individual background as possible, in order to apply the correct educational procedures.

2. An individual's learning disability must be interpreted in terms of the level of experience involved: perception, imagery, symbolization or conception. Once this level is ascertained, the appropriate remedial procedures can be employed.

3. Remediation procedures must be tailored to the type of involvement manifesting as learning disability. The learning problem might be one of meaning versus non-meaning, or verbal versus non-verbal factors. Johnson and Myklebust point out that meaning is both a psychological and neurological factor in learning, and that the neurology of verbal behaviour differs from that of nonverbal behaviour. Furthermore, teaching to the type of involvement entails assessing whether the learning deficit involves intra- or intersensory learning, and whether the function of integration is affected.

4. Because of the nature of brain dysfunction, and the numerous types of learning disabilities, the concept of multiple states of readiness is vitally important. The remediator must assess not only whether the child is school-ready, but whether he is ready for a level of self-control and responsibility, and then provide opportunities for growth according to the current readiness levels.

5. Learning involves both input and output. The child who fails to comprehend the spoken or written word, or to understand time and space, has his total experience reduced. He is emotionally immature as reflected in his poor ego development. He becomes severely retarded in thought, understanding and adjustment. The child with output

difficulties is the less debilitated, because he, at least, has the tools for inner language, emotional growth and adjustment.

6. Both psychological and neurological tolerance levels are altered in children with learning disabilities due to brain dysfunction. Remedial procedures must take account of this, and avoid overloading in particular.

7. The multisensory approach is advocated in order to stimulate the child in every way possible. However, this approach needs to be carefully individualized for each child: the number of sensory modalities to be activated depends on the child's total capacities and tolerance levels. Many workers have chosen to teach only to the deficits or to the integrities. Johnson and Myklebust point out that these approaches assume interneurosensory learning. Often, it is these integrative facilities which are deficient.

8. The controlling of variables important to the child's specific learning disability is stressed. Some children require emphasis on the control of attention, on the prevention of distractibility. Other children require the proximity variable (closeness to teacher, to other children, etc.) to be adjusted. The rate at which material is presented, and the size of the learning material are also revelant variables which might need to be controlled for certain children.

9. The child must be educated in both verbal and non-verbal spheres if he is to gain in all areas of experience.

The value of this approach is that it takes cognisance of both psychological and neurological factors. It was developed from research and actual remediation procedures used with a large number of children. Whether this approach will stand the test of scientific time remains to be seen. At present it is the most comprehensive approach available.

Unlike Johnson and Myklebust, many remedial workers have focussed only on certain aspects of the total learning process. Traditionally, more emphasis was given to visual perception than to any other perceptual processes, but the crucial role of auditory perception has recently been recognised.

Frostig (I967) found that 43 per cent of children seen for perceptual handicaps were inadequate in auditory perception. Before any remedial programme could be devised for auditory perception, it was necessary to distill the various subskills making up auditory perception and to set up a sequential hierarchy of these subskills. Messing (I968) isolated eight categories of skills: auditory awareness, auditory focus, auditory figure-background, auditory discrimination, auditory memory, auditory scanning, auditory integration and synthesis and auditory feedback. Flower (I968) identified similar subskills. He points out that such a hierarchy presents certain difficulties for designing teaching methods, in that I) each subskill becomes contaminated by other learning processes, and 2) the relationship between training in an auditory subskill and academic improvement has not yet been clearly established.

To date, there has been a dearth of studies showing the effect of training in auditory-perceptual skills on any academic achievement measure. De Hirsch (I966) demonstrated that two auditory perception tasks contributed significantly to two predictive reading tests: the "Wepman Auditory Discrimination Test", and the "Imitation of Tapped-out Patterns Test". However, these tests do not assess auditory perception only. Other learning processes, e.g. short-term memory, are also assessed. The same is true of Dykstra's (I966) research. He found that five auditory discrimination measures contributed significantly to a prediction of reaching achievement: discrimination between spoken words which do or do not begin with identical sounds, detection of rhyming elements at the end of words, identification of the correct pronunciation of words, using auditory clues with context clues to identify strange words and recognising similarities and differences in final consonants and rhymes. Research with the "Illinois Test of Psycholinguistic Abilities" has shown that children with reading disability do poorly on the subtests of auditory short term memory and grammatic closure. De Hirsch et al (I966) found statistically significant numbers of poor readers with auditory discrimination weaknesses. However, much research remains to be done in this area.

As far as the relationship between memory disability and its remediation is concerned, there is even less research material. Despite the fact that memory plays such a vital role in every aspect of learning, the only significant work in the area was a piece of research done by Chalfant and Scheffelin (I969). They suggest that it might be possible to improve the storage and retrieval of specific kinds of information through improving techniques of selective observation, organization of materials, and repetition.

With regard to deficient cognitive skills, little work has been done on the development of remedial teaching strategies. Stimulus-response proponents have suggested adapting the behaviour modification and programmed instruction approaches to the needs of learning disabled children with cognitive deficits. (Skinner et al I968; Sullivan Associates, I969; Atkinson and Hanson, I966; Ellson et al, I965). The assumption underlying these approaches is that cognitive learning of complex processes is similar to the learning of simple skills. This assumption has been severely criticised with regard to the normal child as being too simplistic (Luria, 1961; Chomsky, 1968).

A more complex approach is the hypothesis-testing one. Stauffer (I969) used this approach in the teaching of cognitive skills associated with reading. He pointed out that children should be taught to read in such a way that they are free to develop cognitive and thinking skills. Unlike the case in behaviour modification, the child, not the teacher, must collect the data, make predictions, pose the problems and ask the questions and finally, find the solutions. The child's errors afford the teacher insights into the defective processes.

In recent years, a number of Piaget's followers have suggested the implementation in the classroom of many of his formulations about cognitive development (Freyberg,I966; Peel,I959; Sigel,I969; Sigel et al,I969). Many of their suggestions could be incorporated into remedial programmes, although no work has yet been done in this sphere.

As far as remedial programmes and social maturity is concerned, there are few research studies. Behaviour modification techniques have been used in a few studies of learning disabled children. These studies indicate that the social behaviour of these children can be modified and their academic learning can be improved (Lovitt,I967; Lovitt et al, I968; Haring and Hauck,I969). Behrens (I963) studied a heterogeneous group including dyslexics, aphasics, dysgraphics and dyscalculics. He found that after a period of remediation, social maturity did not show the expected improvement. Johnson and Myklebust (I965) improved on this design by choosing a homogeneous group (60 dyslexics) and found a significant improvement in social maturity after a period of remediation. Much work still remains to be done.

Reviewing the area of theory and remediation techniques, Strang (I968) pointed out that remediation and treatment have received relatively little attention, and that theory building has claimed more time than remedial procedures. The gap between theory and practice remains large, and often there is little evidence of an unequivocal link between theory and remedial practice.

> Teachers, however, cannot wait for researchers to close the gap and verify teaching methods. Teachers must face children with problems every day and must take some action to help them.
>
> (Lerner I97I p. 87)

2.3 A note on Piaget

Although Piaget's work falls outside the mainstream of work on learning disability, his theories and their educational implications are certainly germane to the whole field. His conceptualization of the origins of intellect overlaps to some extent with that of Kephart. Both stress that normal sensorimotor development is prerequisite to orderly symbolic functioning. Piaget's (I962) formulations on the growth and development of conceptualization in the child, and his discussion of the nature, growth and importance of social

co-operation fill a gap in the general body of knowledge accumulated by the learning disability researchers. Very few of them focus on either conceptualization in the child, or the importance of co-operation as a stimulus to conceptualization. The teaching principles that emerge from Piaget's theories have become the subject of much ongoing research, and include the following which are of relevance for learning disability:

1. Cognition is action.(Kephart, Frostig and others incorporate this principle into their training programmes.)
2. Mental structures or schemata are achieved sequentially, and then integrated. (Birch, Deutsch and Schumer have investigated unimodal processing and intersensory integration.)
3. A new structure serves to organize new knowledge and conversely, a new situation modifies the structure. (This principle is implicit in many remedial programmes.)
4. The motivation principle: if the discrepancy between new input and already established structures is within the optimal range (i.e. the complexity of the child's cognitive structure almost, but not quite, matches that of the input), then learning will occur without external reinforcement. This is an important principle for any effective remedial programme.

Any teacher-pupil interaction involves at least three factors:

1. the teacher's conception of the learner,
2. the learning process and
3. the nature of the subject matter.

Since teaching strategy and curriculum planning are dependent on the child's capacity, it is necessary for the teacher to identify the child's level of cognitive functioning. Piaget's cognitive tests could be an invaluable addition to the battery of diagnostic tests used by the remedial teacher.

CHAPTER 3

3.I Definition of the problem area

Much has been written on the myriad and often confusing terms designating this group of children. The syndrome which they exhibit has been variously labelled as "minimal brain dysfunction", "minimal cerebral palsy", "minimal cerebral dysfunction", "maturational lag", the "Strauss syndrome", "central processing dysfunctions", "learning disabilities" and "psychoneurological learning disabilities".

Each label reflects the thinking at the time of its coinage. As research and knowledge have accumulated, so the older labels such as "brain-injured", "Strauss syndrome", and "minimal cerebral palsy" have been discarded. From the time that Clements (1966) first proposed the label "minimal brain dysfunction" (MBD), it has featured in much research as the label of choice. Studies published in 1973 still feature this label, and so it would seem appropriate to spell out its difficulties and implications before proceeding further.

The term as such is a behavioural concept with neurological implications. It is a behavioural concept because it is defined largely by certain behavioural features (rather than by infra-behavioural evidence of cerebral abnormality). With respect to the term "minimal", Benton (1973) points out that the literature provides evidence that cerebral lesions in children must either be quite extensive or have specific disorganizing functional properites in order to produce important behavioural abnormalities. Hemiplegic children, for example, have been subject to cerebral hemispherectomy without any evidence of harm and with ample evidence or beneficial effects on previously intractable epilepsy and/or behaviour disorders. Benton therefore concludes:

> ...if the behavioural deviations defining MBD are to be ascribed to brain damage or dysfunction, then that damage or dysfunction can hardly be 'minimal' in character. Nor is there evidence that it is actually less extensive than the cerebral alterations underlying

> mental deficiency or cerebral palsy: the differences may well be qualitative in nature.
>
> (p. I7)

The term "minimal" has traditionally served to differentiate this syndrome from those resulting from gross insult to the brain. Such differentiation is important, but the term "minimal" seems to be inappropriate for the task. It has the further disadvantage of begging the question: How much is minimal?

The term "brain" in the label is unsatisfactorily vague. It carries etiological implications for which, in many cases, there is no evidence. (O'Malley and Eisenberg, I973; Wender, I97I). It suggests (without specifying its location or nature) that there is some structural or biochemical alteration associated with the behavioural and psychological alterations manifested in these children. This aspect of the problem is yet to be defined more precisely. Wender (I97I) has made a start by suggesting that the MBD syndrome may be based on a defect in monoamine metabolism, and that the biochemical defect is most likely to occur in the MBD subgroups with genetic etiology. However, the only evidence thus far that any of these children have a biochemical defect is the dramatic improvement of carefully selected children to amphetamine or methylphenidate therapy; and there is only indirect laboratory evidence (adduced from experimentation with animals) to associate variations in bioamine metabolism with changes in behaviour (Wolff and Hurwitz, I973).

Satterfield (I973) found a significant correlation between the amount of brain dysfunctions (as judged by EEG and neurologic examination) and the probability of response to methylphenidate treatment. He feels that these findings suggest a neurophysiological basis for MBD and that they are consistent with a theory of delayed maturation of the CNS. However, he fails to spell out these suggestions any further and it remains for further research work to clarify this area.

Denhoff et al (I956) introduced the concept of "syndrome of cerebral dysfunction" because of the many different possible sources of

malfunction of different components and systems of the brain. Depending on the source and the timing of the malfunction, the area involved and the adaptational and compensatory mechanisms available to the individual, one or more of the "Syndromes of cerebral dysfunction" may result. Because these syndromes often occur in conjunction, however, confusion has arisen as to what should be regarded as characteristic of cerebral dysfunction.

"Dysfunction" summarises those behavioural and psychological manifestations of the assumed structural and/or chemical alterations. Functionally defined, such alterations would give the child an impaired nervous system with which to interact with the environment. Development resulting from such an interaction will therefore be different from that seen in children without such impairment. Capacities of the child for adaptation become limited and psycho-social maladjustments result. "Dysfunction" also holds the promise of "better functioning". Many (but not all) MBD children manifest immature EEGs.(O'Mally and Eisenberg,I973; Satterfield,I973). Satterfield (I973) indicated that those manifesting both immature EEG patterns and soft neurological signs responded to drug therapy in such a way that their behaviour and mentation became more age-appropriate. Prior to drug treatment, these children had been judged as "immature". In addition, there has been much research documenting the beneficial results of remedial education for the MBD child (Chaney and Kephart,I968; Francis-Williams,I964; Johnson and Myklebust,I967; Kephart,I960; Strauss and Kephart,I955).

As the focus of attention began to move to the educational and psychological consequences of the syndrome, new terminology was suggested: Kirk (I963) proposed the term "learning disabilities". This term focusses on the behavioural symptoms and avoids the etiological difficulties. However, it remains a blanket term failing to specify the area(s) in which the child has learning disabilities and the learning processes which are deficient. Despite these difficulties, the term has been widely adopted.

A more comprehensive, complex and encompassing label was suggested by Johnson and Myklebust (I967): "psychoneurological learning disabilities."

This term is in accordance with the current educational and psychological emphasis. Instead of ignoring the neurological factor, it focusses on the fact that certain learning processes are significantly altered by neurological brain dysfunction and that this state of affairs results in a learning disability. The prefix "psycho" emphasises that an important concomitant of the neurological dysfunction is behavioural in nature. Johnson and Myklebust point out further that a learning disability can result from various conditions. The condition with which their label concerns itself is dysfunction in the brain. They recognize that the class of "learning disabilities associated with brain dysfunction" is a homogeneous one in that there is generalized integrity of such functions as motor ability, intelligence, hearing, vision and emotional adjustment but a deficiency in learning. They point out that to some extent, each group of handicapped children overlaps with each of the other groups, and so there may be children with learning disabilities who also have motor inco-ordination as well as emotional disturbance. There is also the phenomenon of multiple involvements to consider: for example, a child may have a learning disability superimposed on deafness, mental retardation, etc. These factors serve to complicate the diagnosis and remediation of psychoneurological learning disabilities and make the task of finding adequate defining characteristics an ongoing one.

As far as defining "disability" is concerned the question must be posed as to how much of a deficiency in learning must be evident, and on what functions, before it may be defined as a learning disability.

Johnson and Myklebust propose the concept of the "Learning Quotient" as a means of quantifying how much learning deficiency is to be defined as a learning disability. They suggest that

> A neurogenic learning disability is a type of underachievement, but it differs from others in that it is due to a dysfunction in the brain and occurs in the presence of the integrities (discussed above). The question before us then is: How much of a discrepancy between ability and achievement must occur for the condition to be categorized as a learning disability?
> (1967, p. 18)

The Learning Quotient ascertains the degree of learning achieved in relation to intellectual potential for learning. They choose an IQ of 90 as the lowest level of intelligence to be included in the learning disability group and therefore take a Learning Quotient of 89 or less as indicative of a deficit in learning.

When the Learning Quotient is applied to children under the age of IO or II years, however, other factors must be taken into account. Readiness, especially writing- and arithmetic- readiness appear to be dependent not only on mental capacity, but also on physical maturation and school experience. Another common index of the extent of deficiency also runs into difficulties. Extent of deficiency may be adjudged by ascertaining whether the child is one or more years behind the level of expectancy. However, one year below expectancy has different implications at ages 8 years, I6 years, and 4 years. The Learning Quotient overcomes this problem by utilising a ratio which is comparable for all ages. Another index of learning disability may be achieved through analysis of the relationship between the various subskills of a child's functioning. Uneven patterning suggests that a weakness in specific areas is impeding learning. Just how uneven the pattern must be to warrant a diagnosis of learning disability still remains to be unequivocally stated. Until such time as the problem of quantitative definition is solved, however the remediator must use the available measures, imperfect though they may be.

As to the problem of areas of deficit, traditionally, attention has been paid to those deficits which are most obvious - those deficits in verbal learning that pertain to acadamic success. However, it is obvious that the deficiency may be in either verbal or nonverbal learning. Deficits in verbal learning include deficits in the learning of arithmetic, and deficiencies in acquiring the spoken, read and written word. Deficits in non-verbal learning include disturbances in learning to tell the time, in directionality, in body orientation, in music and rhythm, in meaning as conveyed through art, and in social perception. Neurologically, these deficits imply dysfunction in the right hemisphere of the brain, whereas the verbal deficits implicate the left hemisphere.

More specifically, verbal deficits involve either input or output, reception or expression, or both. They also require that the sensory modality (or modalities) be ascertained through which a given type of verbal learning occurs and through which the learning processes may be deficient. The verbal systems are predominantly auditory and visual. Furthermore, much academic learning is auditory, visual or both. The spoken word involves auditory receptive processes and an auditory expressive function. Reading and writing involve visual receptive and visual expressive processes.

However, receptive and expressive facilities can be intact in the face of some of the most severe learning disabilities. Learning may be impeded on the level of intersensory integration. This level is the most complicated and subtle one to measure because the processes whereby meaning is achieved are psychologically and neurologically highly complex. At present, the type of tests available for measuring both intelligence and achievement leave the area of integrative learning largely untouched. It is clear that this area still requires intensive investigation. Tests of social intelligence and social perception must fulfill this need for the present.

To date, no one label has superseded all the rest as the label of choice in the literature. All the labels currently employed define the same basic population of events. For the sake of convenience, and in order to reflect the current state of affairs as well as to report accurately on the literature, the terms "MBD" and "learning disabled" will be used throughout this text to refer to this basic population of events.

3.2 The neurological issue

A sine qua non of most of the definitions of learning disability is the assumption of brain dysfunction. The issue of whether neurological evidence is mandatory before such classification is warranted, is a controversial one. The research involved in this area has revealed that for certain children, no one type of evidence is clearly definitive. No one type of appraisal will necessarily reveal brain dysfunction in a given child. It is possible to find positive neuro-

logical signs in children who manifest no behavioural symptons, just as it is possible to find learning deficits in the absence of neurological findings. That the neurologist may be unable to find evidence of disorders in children whose dysfunctions exist and are of substantial consequence to behaviour, may be due merely to the current lack of refinement of the neurological examination and electroencephalographic procedures. Boshes and Myklebust (1964) and Myklebust (1967) point out that neurological evidence revealing dysfunctions in the brain can be found more often than is popularly assumed, and that in one study, agreement between behavioural and neurological findings has been found in as many as 80 percent of children referred by schools on the presumption that neurogenic learning disorders were present (Myklebust and Boshes, 1960).

As no one procedure is infallible for providing evidence of all types of learning disabilities, the most useful procedure is to consult as many information sources in as comprehensive a way possible.

3.3 The diagnostic problem

Having dealt with the terminological issues, there still remains a practical problem. In practice, the clinician labels as minimally brain damagedor learning disabled not only children exhibiting all the signs normally classed together under this rubric, but also children exhibiting only behaviour problems, without any ostensible neurological signs. Before proceeding, it would be useful to list the signs normally classed together under this rubric (after Birch 1964).

1. Disordered behaviour. The child is not necessarily more active than his contemporaries, but his activity is undirected, unfocussed, and the direction may shift from moment to moment.
2. Short attention span, distractibility of attention or, on other occasions, perseveration.
3. Emotional lability, resulting in unpredictable behaviour.
4. Social incompetence. The child may be described as functioning at a social level below his age and often far lower than his estimated intellectual standing. In games, he often manifests

awkwardness and clumsiness.

5. Defective work habits.
6. Impulsivity and lack of social inhibition.
7. "Soft" neurological signs.

These children certainly show an increased prevalence of "soft" neurological signs. However, these signs are slight, often inconsistenly present and, as already discussed, not clearly associated with localized neuro-anatomical lesions. The diagnostic usefulness of such signs is further limited by the fact that they occur in a moderate number of apparently "normal" persons. Thus the clinician is faced with the fact that about 50 per cent of MBD or learning disabled children are neurologically intact; the syndrome can appear in the total absence of neurological signs (Wender, I971).

Motor restlessness or hyperkinesis is often hailed as the hallmark of learning disabilities. However, an emphasis on motor restlessness as an obligatory criterion would exclude those children with minor neurological signs and behavioural disturbances who, at the same time, show motor inhibition. Furthermore, behaviour patterns in learning disabled children diverge widely: some might withdraw, others might display exaggerated and unpredictable responses to the slightest stimuli.

In clinical practice too, MBD is diagnosed in both the presence and absence of EEG abnormalities (O'Malley and Eisenberg, I973). The picture is further complicated by the fact that the MBD syndrome comprises a wide variety of deficits. Hughes (in Myklebust, I968) found that those with slight/moderate learning disabilities showed electrocortical abnormalities. Children with nonverbal disturbances of learning, on the other hand, were found to have abnormal EEGs much more often than poor readers or those with mixed disorders.

Clinically, there is no consistent pattern of dysfunction on perception, cognition and intelligence tests. Many children with minor neurological signs perform in the superior range of intellectual functioning. On the other side of the coin, evidence that relative mental retardation is frequently the case in MBD is provided by Palkes and Stewart (I972). Comparing the WISC IQs of hyperactive children

with those of matched controls, they found that the mean Verbal and Performance Scale scores of the hyperactive group were lower than those of the control group. They also found greater variability among the hyperactive children, suggesting that many of them were generally mentally retarded. When adjustment was made for this difference in IQ, the hyperactive children performed up to expectations on perceptual, perceptuomotor and school achievement tests, indicating that what might have been presumed to be specific disabilities could plausibly be viewed as expressions of a general mental retardation. Some MBD children are of normal intelligence. Conners (as quoted by Wender, 1971) reviewed the area of psychological test performance in children and found not only that children with documented cerebral lesions fail to show a single pattern of dysfunction, but also that the same was true of children without documented lesions. Sometimes a discrepancy is found between Verbal and Performance scores on intelligence tests. This pattern usually occurs in conjunction with perceptual disturbances but is by no means typical of all MBD children (Bender, 1956; Conners, 1967; O'Malley and Eisenberg, 1973). Performance on perceptual tests is variably affected: the Bender-Gestalt Perceptual Motor Test, and tests of figure-ground discrimination (visual and auditory) are often, but not invariably affected (Bender, 1956). Thus, the clinician cannot rely solely on psychological test performance as an index of MBD.

In his diagnostic endeavour, the clinician might seek pathognomic etiological factors. However, except for the rare child who manifests the syndrome as a result of a noxious agent, such as lead poisoning or encephalitis, or as a result of brain trauma, the cause has been elusive (Needleman, 1973; O'Malley and Eisenberg, 1973,. There is considerable evidence that the syndrome has several distinct and separate aetiologies. Wender (1971) lists the following possible causative factors:

1. organic brain damage,
2. genetic transmission in the form of
   a. a polygenetic abnormality or
   b. an extreme placement on the normal distribution curve,

3. Intra-uterine "random" variation in biological development,
4. fetal maldevelopment and
5. psychogenic determinants.

Many studies conducted by Knobloch and Pasamanick (reported in Wender, I97I) have demonstrated an association between prematurity, prenatal difficulties, paranatal medical complications and a variety of psychological, behavioural and neurological abnormalities in children. Another aetiological theory implicates prenatal or early childhood malnutrition in the maturational delay of MBD children. Retarded bone age and some endocrine imbalance have also been found to be related to nonachievement at school and problem behaviour (Zieman, I969). The etiological picture is further confounded by the fact that a single cause is unlikely, as mentioned above. The behavioural and psychological manifestations might represent the final common pathway of diverse pathologies. What is more, the syndrome might result from the interaction of subthreshold amounts of the etiological components listed above (Wender, I97I). Thus etiological factors offer no short-cut to the diagnostic destination.

In his search, the diagnostician might focus attention on the socio-economic variable. However, he will be frustrated here too, as the MBD syndrome is "found in children of all socio-economic groups in countries throughout the world" (Report of the Conference on the Use of Stimulant Drugs in the Treatment of Behaviourally Disturbed Young School Children, I97I). If the diagnostician is able to divide his MBD sample into subgroups of hyperactive and hypoactive children, he may then make use of Denhoff's (I973) finding that hyperactive children tend to come from the lower social classes, and that hypoactive children come from higher social classes. If he does so, he must take into account Cohen's (I973) study. Cohen investigated the behavioural deficit patterns of middle class and lower class children. He compared the learning disability patterns of a category of children classed as "disadvantaged" with a variety of middle class retarded readers diagnosed as "dyslexic" or "learning disabled" or "minimally neurologically impaired" or "perceptually dysfunctioning". He found no differences between the socio-economic groups, except for the relationship between the first two subtests of the WISC. All behaviour patterns were comparable. Obviously,

the subgroups used in the two research studies are comparable only in socio-economic status, and not in the behavioural patterns on the basis of which they were assigned to the various subgroups. Thus the diagnostician is no nearer his desired goal.

[To date, there appears to be no research documenting the responsiveness of children from different socio-economic levels to remedial procedures. The socio-economic variable was therefore built into the present research study, (section 3.9).]

The diagnostic problem is further complicated by the emotional overlay accompanying early underachievement (Ziemen, 1969). Rejection, ridicule and disturbing experiences at home and at school lead to anxiety, which worsens as the environment expands. The child becomes discouraged, angry, jealous and increasingly frustrated. Increasingly too, he sees himself as a failure and as lacking in worth. However, the child displaying this sort of behaviour is not necessarily classifiable as MBD. He might merely be emotionally reactive to an uncongenial environment which, when ameliorated, results in amelioration of the "problem behaviour" (Freedman and Caplan,1967; Wender, 1971).

Should the diagnostician look to epidemiology in an effort to ascertain how often he might meaningfully diagnose MBD, and how often he will be faced with false positives, he might be more hindered than helped. The literature reveals that, due to the lack of precise definition and the controversial nature of the area, prevalence is difficult to establish. Furthermore, classical cases are much less common than atypical ones. Incidence figures range from 3 to 20 per cent of the elementary school population, varying from study to study, and from area to area (Campbell et al,1971; Chaney and Kephart, 1968; O'Malley and Eisenberg,1973; Wender,1971; Zieman,1969). The South African figure has been assessed as 15 per cent of the White primary school population (The Star, 1972). The incidence figures for children attending psychiatric clinics are even higher. Wender (1971) found that 50 per cent of school age children in an American university clinic exhibited the syndrome, and that 50 - 60 per cent in a county clinic fell into the MBD category. In view of these

findings, he comments:

> The minimal brain dysfunction syndrome should be a major target for 'secondary prevention' (i.e. treatment) in the school age population, as it apparently constitutes the major fraction of psychiatrically disturbed children.
>
> (p. 6I)

In this regard, differential diagnosis becomes even more difficult when Wender's (I97I) speculations are taken into account. He postulates that "a large number of psychiatric conditions of children can and should be included under one conceptual roof" (p. I). He sees the core disorder as the syndrome labelled here as MBD or learning disability. Thus, the syndrome is seen not only to occur in conjunction with, but possibly as the basis of virtually all the nosological categories of childhood behaviour disturbances. Wender is attempting here to clear rather than compound the confusion by formulating a global theory to encompass all the clinical syndromes mentioned as well as the whole range of neurotic, psychopathic and schizophrenic variants of childhood behaviour disorders. His theory will be dealt with in more detail in the next section.

Conners (I973) summarises the diagnostician's dilemma in the following way:

> ...in children who are suspected of having MBD, there may well be a variety of neuropathological insults that lead to a variety of psychological changes, the nature of which vary as some function of developmental level, temperamental predisposition, and the quality of the environment...We should expect many particular psychological test patterns to occur because many functions or processes are potentially alterable, including such fundamental variables as sensory and perceptual discriminations, attention, inhibition of responses, sensory integration (both inter- and intramodal), non-specific arousal, orientating and habituating processes, perceptual-motor integration, speed of reflex processes and many more.
>
> (p. 285)

Whatever label is used, the most crucial findings concerning the characteristics of these children, is the great range of individual differences within the category (Capobianco, I959; Clark, 1960; Gallagher, I957).

3.4 Empirical consequences of the syndrome

Whatever the theory, and whatever the research findings, however, the practical consequences of the syndrome remain the same. They may be classified as follows:

I. Motor dysfunction

The child usually exhibits hyperactivity, although in a few cases there are motorically hypoactive children who nevertheless manifest many other characteristics of the syndrome and are therefore diagnosed as belonging to the MBD group (Wender, 1971). Another major motor deviation is inco-ordination. The MBD child may have poor fine motor dination and/or poor visuo-motor co-ordination. He is frequently described as a clumsy, inept child. There may be motor speech difficulties (poor articulation and disturbances in the rhythm of speech). The distinguishing feature of his physical activity is that it is undirected, impulsive, without focus and easily shifted in direction.

2. Attentional and perceptual-cognitive dysfunction

The MBD child usually has a short attention span and poor concentration. Strauss and Kephart (1955) comment that distractibility is often the most obvious of the difficulties experienced by these children. Not only are most MBD children distractible, but on occasion, many of them also exhibit seemingly obsessive interest in, attention to, and perseveration on minute details. (Both the distractibility and the perseveration seem to be manifestations of an inability to set up hierarchies of importance. This inability suggests a deficient stimulus filtering mechanism which may be of the sort operating in schizophrenia and autism, and if so, would lend support to Wender's views). Cognitively, MBD children manifest varied patterns of defect. (Many . both cognitive and noncognitive problems. Many may exhibit hyperactivity and other aspects of the syndrome without having any specific perceptual-cognitive problems). Myklebust (1973) found that disturbances in cognition were the primary

bases of the learning difficulties experienced by the learning disabled children in his sample. He postulated that it is the process by which the child learns, and the way in which these processes differ from the norm, that provide the basis for identification, diagnosis and remediation. He found that the most crucial cognitive disturbances in his learning disabled sample were inability to associate verbal and nonverbal information and lack of facility in converting auditory information into visual information and vice versa.

Kephart (I958) points out that one of the major aspects of the difficulties experienced by MBD children is the organization and integration of perceptual and cognitive information. There is continual confusion and conflict between items of learning so that patterning and integration of elements fails to occur. The abilities to abstract and then generalize are dependent on this ability to integrate. The MBD child is therefore able to deal with isolated facts adequately, but immediately experiences difficulty when a task requires the simultaneous awareness of a large number of related items and their relationships. Koppitz (I968) found that what distinguishes the MBD child from his non-MBD counterpart is primarily a malfunctioning of his integrative capactiy. This malfunctioning may result in slower development, or incomplete or distorted functioning of perception, conceptualization, movement, expression and social behaviour. Thus, not only is incoming information disrupted, but outgoing responses are disorganized in such a way that the overt response becomes inappropriate or erroneous. School underachievment is almost a hallmark of the syndrome.

Similarly, Birch (I964) stresses intersensory integration as one of the cornerstones for the normal utilization and integration of environmental information. He found that the emergence of such intersensory relationships appears to be delayed in the MBD child. Given such a primary defect; the development of bizarre integrations and aberrant developmental paths become possible.

3. Deficiencies in impulse control

These deficiencies manifest as decreased ability to inhibit, low

frustration tolerance, anti-social behaviour such as stealing, lying, sexual acting out, etc, impaired sphincter control, poor planning and judgment, personal and academic disorderliness, tasks left incomplete, recklessness, destructiveness and poor work habits.

4. Defective interpersonal relations

These children appear to be impossible to acculturate; they are resistant to social demands, often obstinate, stubborn and negativistic and are disobedient. They often display increased independence and extroversion (although the occasional MBD child may be excessively timid). Wender (I97I) points out that the least consistent aspect of behaviour is in the area of affection and dependence. One subgroup of MBD children appears to be non-affectionate and non-dependent. Another subgroup contains MBD children who are excessively dependent, or who vascillate between excessive dependence and independence.

5. Emotional disturbances

There is evidence of increased lability, altered reactivity to both internal and external stimuli, increased aggression, diminished pain responsiveness and dysphoria. The dysphoric element presents variously as anhedonia, depression, low self-esteem and anxiety. MBD children may express feelings of guilt and unworthiness; they may be lacking in zest and initiative. Their anxiety may express itself in compulsive behaviour (Benton, I962; Birch, I964; Campbell et al, I97I; Douglas et al, I969; Strauss and Kephart, I955; Wender, I97I; Wolff and Hurwitz, I973).

3.5 Wender's Theory

To return to Wender's (I97I) theory, the following three elements are postulated to be among the primary "psychological" ones from which all the other symptoms of the MBD syndrome derive (these "psychological" defects may, in turn, be attributable to certain common and specifiable biochemical and anatomical lesions):

I. Decreased experience of both pleasure and pain.

2. A generally high and poorly modulated level of activation.
3. Extroversion.

In order to amplify, Wender offers the following speculations:

I. Both distractibility and perseveration may be seen as "products of an inability to attenuate the attractive power of internal and external stimuli and are related to the postulated primary deficit concerning activity".

2. Impulsivity may be seen as a compound of the primary deficits and is possibly related to inhibitory defects arising from decreased reinforceability and an activity malfunction.

3. The difficulty experienced in acculturating these children may be associated with their decreased ability to experience pleasure and pain. This decreased responsiveness to pleasure and pain weakens the usual bond between parent and child. Thus dependency on and indentification with the parents are weakened, as are superego and ego-ideal development. Narcissism and diminished sensitivity to censure are the natural outcomes of the diminished proclivity to identify and take the position of the other.

4. Cross sexual identification can result from poorly modulated levels of activation. In girls, excessive physical activity, lack of docility etc, are culturally regarded as masculine and not feminine traits. In boys who exhibit hypoactivity as part of the MBD pattern, poor motor performance may lead to peer rejection followed by a compensatory overevaluation of feminine activities. In addition, general inadequacy may foster excessive dependence on the mother figure.

5. The feelings of rejection and lack of self-worth can frequently lead to mild paranoia.

6. Provocative and attention-seeking behaviour may be seen as a product of low self-esteem, failure to receive interpersonal gratification through the normal channels and the normal need to receive approval and gratification.

These examples are speculative and suggestive in nature. They have yet to be experimentally verified or rejected. What is important here is that they are germane to the whole field of psychopathology, not only in children, but in adults too.

3.6 MBD and Psychopathology

If it is possible that the MBD syndrome in children is either the precursor or the first manifestation of a considerable number of seemingly different adult psychiatric syndromes, then the recognition of the relationship between the earlier and later manifestations of the syndrome becomes of vital therapeutic and preventive importance. It is characteristic of the syndrome that the affected areas of functioning change over time: certain dysfunctions seem to disappear while others become more salient. In the first year of school, for example, motor restlessness is generally the most salient feature. Academic problems tend to be ignored at this stage, and enuresis may "appear" for the first time. In the first few school years, academic problems feature prominently. By the time of preadolescence and early adolescence, different manifestations of the syndrome have taken precedence: anti-social problems are focussed on far more frequently than academic ones. By age IO, the child may have fallen several classe behind his contemporaries in reading. As performance in many other subjects depends on reading skill, the chi.d's general academic level tends to become retarded. This is often followed by rejection by adult authorities and "normal" peers. From here, it is a short step to taking up with a group of social outcasts.

Stewart et al (I966) studied 45 adolescent youths who had been categorized as hyperactive 5 years previously. 3I per cent exhibited persisting hyperactivity, inability to concentrate, overtalkativeness, inadequate school performance and poor self-esteem. A significantly lower incidence of these symptoms in a normal adolescent population was reported in another study conducted by MacFarlane et al (I954).

Denhoff (I973) reports that many MBD children show delayed emergence of adolescent concerns and that some only begin to find stability

around 26 or 27 years of age. There is a delay in the ability to "find themselves" sexually, emotionally and educationally. (Although the presence of MBD may be an important factor associated with the delayed emergence of adolescent concerns, it is likely that other factors play a part too e.g. family interaction, psychodynamics, peer relationships, environmental circumstances, etc.)

Menkes et al (1966) found that some patients reported persistent feelings of restlessness lasting up to the age of 30 years. Although the outward signs of distractibility and inattentiveness may disappear with age, the problem may remain in a more muted form. Older subjects report continued difficulty in concentrating (Wender, 1971).

MBD has been implicated by several studies of adolescents with academic problems (Laufner, 1962). Frisk et al (1967) found that one third to one half of Swedish teenage dyslexics exhibited current distractibility and restlessness, and sleep disturbance or impaired motor abilities. In addition, during childhood, they had had an increased prevalence of speech difficulties, clumsiness and enuresis. Hammar (1967) showed that about 50 per cent of a non-selected group of "adolescent under-achievers" consisted of MBD children grown up. These adolescents were characterised as having poor memory retention and short attention span, as distractible and impulsive. Hyperactivity was not regarded as a problem. This data further supports the hypothesis that hyperactivity may disappear with age, while other characteristics may not. Hammar then refined his sample further by eliminating those with previously undiscovered retardation and found that 67 per cent of the under-achievers were minimally brain dysfunctioned.

Weiss et al (1971) conducted a five year follow-up study of 64 hyperactive children who met the following criteria: (a) long-term and sustained hyperactivity, (b) 6 - 13 years of age (c) IQ more than 84 as measured by the WISC (d) not psychotic (e) no major brain damage or dysfunction such as epilepsy or cerebral palsy and (f) living at home with at least one parent. The authors found that whereas hyperactivity had been the chief complaint at referral, it was no longer so at follow-up, 5 years later. However

30 per cent of the mothers reported that restlessness was still present, though not severe. Rating scales and classroom observations of hyperactivity suggested that these children did not "necessarily or entirely outgrow their restlessness, but rather expressed it in less gross and disturbing ways" (p. 312). Distractibility, aggression and emotional immaturity were still reported by 70 per cent of mothers at the time of follow-up. 80 per cent of the subjects exhibited poor academic functioning. Only 20 per cent had not repeated at least one class, compared to 85 per cent of the controls. 10 per cent had been members of special classes, 5 per cent had been expelled and only 5 per cent were doing above average work. Weiss et al concluded that although hyperactivity diminished, other major handicaps remained, largely in the areas of attention and concentration. They were also able to demonstrate that their subjects were chronic underachievers despite normal intelligence. They demonstrated further that there was a significant propensity towards psychopathology, featuring emotional immaturity, inability to attain goals, poor self-image and feelings of hopelessness. Their subjects could easily be differentiated from their peers in terms of their greater restlessness, aggression and anti-social acts.

With reference to anti-social difficulties, the compulsive lying indulged in by some MBD children may persist into adolescence. Wender (1971) points out that an appreciable fraction of anti-social and delinquent children may have MBD characteristics.

Earlier manifestations of non-compliance with authority may change with age and take the form of passive-aggression. It is obvious that the longer an MBD child has experienced harsh authority and peer rejection, the more hostile and anti-social he might become. The behaviour socially defined as "deviant" may then stimulate patterns of behaviour reactions which further aggravate the difficulties.

Menkes et al (1967) conducted a twenty-five year follow-up study of 14 children originally diagnosed as "hyperactive children with minimal brain dysfunction". All subjects had IQ ratings above 70. At follow-up, 4 were found to be hospitalised psychotics, 2 were retarded and 4 had been institutionalised at some point in time.

The studies quoted above would appear to lend credence to the association between MBD and psychopathology. However, as already pointed out, the area covered by the MBD label does not possess fixed, specific and immutable boundaries. A number of logical problems arise because of this lack of clarity:

I. If MBD is the precursor to or first manifestation of later psychiatric disorders, when does the diagnosis change from MBD to the specific psychiatric disorder?

2. Related to this difficulty is a further difficulty peculiar to the longitudinal and retrospective studies. When researchers report what, for all intents and purposes, sound like MBD characteristics is this evidence enough of the presence of MBD? In terms of the current behavioural definition, the answer is in the affirmative. Yet there are many instances in medicine and in clinical psychology where different disorders have similar symptoms. Usually there is some decision procedure to ascertain which disorder is in fact underlying the symptoms. As yet there is no such decision procedure for MBD and psychopathology.

3. Thus, in the MBD-psychopathology debate, it cannot yet be firmly argued that MBD is etiologically antecedent to pathology. The reverse might hold, especially if MBD can be traced to a biochemical disorder.

4. MBD may be historically, but not etiologically, antecedent to pathology.

5. If MBD is an etiological factor in psychopathology, it is unlikely to be the only etiological antecedent. There may be considerable overlap between MBD as an etiological factor and other, non-MBD etiological factors, e.g. a repressive, impoverished early environment.

The studies quoted below would fall into this overlapping category. It would thus be erroneous to take them as conclusive evidence of the MBD-pathology relationship. Until the etiological question has been answered more fully, these studies can only be regarded as suggestive.

A deprived early environment may produce a fixed, nonreactive personality structure with many features of the MBD syndrome. Goldfarb (1943) showed that early privation may induce an MBD-like syndrome whose effects are

almost impossible to remediate at or after adolescence. Pringle and Bassio (I958) studied the intellectual, emotional and social development of I88 institutionalised children aged between 8 and I4 years. They found the following MBD characteristics in this group: educational backwardness among 60 per cent of them; restlessness or inability to concentrate among 50 per cent of them and depression among 25 per cent. A significant correlation was found between educational achievement and psychological adjustment. Children with reading disorders were four times as common among those classified as "maladjusted" as among those classified as "stable".

Goldfarb (I96I) found that 65 per cent of schizophrenic children seen at an American treatment centre had or had once had at least minimal signs of neurological damage. Healy and Bronner (I936) compared delinquents and sibling controls on a variety of characteristics reported in the literature to be frequently associated with the MBD syndrome. They found the following to be significantly more common in the delinquent histories: cross and fussy babyhood, enuresis, hyperactivity, restlessness, great impulsiveness and marked feelings of inferiority. A number of studies of psychiatric in-patients reveal a history of MBD-like problems in early life. Hertzig and Birch (I968) demonstrated the presence of "soft" neurological signs in 30 per cent of hospitalized adolescents as compared with 5 per cent of the controls. Pollack et al (I968) investigated adolescent and adult schizophrenia and found "suggestive" or "strongly suspicious" evidence of a history of early MBD in 47 per cent of their 74 hospitalized patients. Weil (I96I) stresses that MBD children are vulnerable and susceptible to neurotic developments through having to live with the gap between some degree of ego and superego formation and a physiological inability to live up to their demands. However, this does not mean that neurosis is inevitably linked with MBD. Quitken and Klein (I969) examined I05 psychiatric in-patients under 25 years for a history of soft neurological signs during childhood and early adulthood. They found 40 per cent with such signs. This group could then be divided into two distinct, relatively homogeneous groups:

I. those manifesting "obvious intellectual defects, thought disorder,

lack of social skills, social withdrawal and marked inability to organize their life" and

2. those showing relatively intact intellectual functions and little thought disorder, but characterised by "destructive-impulsive behaviour, low frustration tolerance, apparently endogenous mood swings, over-reactive emotionality and temper tantrums".

Commenting on this finding, Wender (I97I) suggests that MBD children with cognitive defects and asociality are more inclined to become schizophrenic or schizoid, while those dominated by impulsivity, over-reactivity and mood swings are more likely to develop character disorders, probably featuring emotional instability.

This suggestion is very attractive in terms of Occam's Razor. However, it appears to be too simplistic and too sweeping a generalization to do justice to the acknowledged complexity of each of these disorders. Wender (I97I) goes further: he suggests that the dimensions posited to account for the MBD syndrome could provide useful parameters for classifying other psychiatric disorders. For example, decreased ability to experience pleasure and pain, together with decreased susceptibility to reinforcement, and therefore to conditioning, may be characteristic not only of MBD, but also of the impulsive character neurosis, the emotionally unstable and immature personality and the sociopath. With respect to schizophrenia, some of the reviewed research has suggested that MBD may at times be antecedent to schizophrenia. What is labelled as borderline, ambulatory or pseudo-neurotic schizophrenia may be seen to be quite MBD-like in manifestation. The individual becomes object-seeking in a perseverative fashion, is very often extroverted and behaviourally active, and seems to be unable to control his own behaviour or thoughts. His cognitive disabilities also appear to overlap with those of the MBD child: he exhibits undirected, unconnected thinking which is lacking in goal orientation.

Wender draws attention to Mowrer's (I948) Theory of Neurosis, which states that many "neurotics" are not excessively socialized and inhibited, but instead are periodically undersocialized and disinhibited i.e. they exhibit occasional MBD-like behaviour.

During these times they are unsocialized and disinhibited enough to trangress but socialized enough to be concerned about the trangressions. Mowrer suggests that their anxiety and guilt stem not from repressed drives, but from awareness of expressed drives, and that this sort of neurotic is anxious about the disclosure of acts rather than because of his unenacted wishes. What proportion of neurotic and character disorders is comprised by Mowrer's "impulsive pseudoneurotics" is unknown. Wender suggests not only that the MBD syndrome contributes to this diagnostic category, but that should Mowrer's description apply to a significant portion of the neurotic character disturbances, the MBD syndrome would be of increasing explanatory relevance. Kubie's (I957) differentiation between the neurotic and the non-neurotic personality also has bearing on the relationship between MBD and psychopathology. According to Kubie, there is a qualitative personality difference that sets the neurotic apart from the non-neurotic. He postulates that there is one personality attribute common to every neurotic act and absent from every non-neurotic act:

> This clinically derived distinguishing trait centres around the freedom and flexibility to learn through experience, to change, and to adapt to changing external circumstances. Thus the essence of normality is flexibility, in contrast to the freezing of behaviour into patterns of unalterability...that characterises every manifestation of the neurotic process, whether in impulses, purposes, acts, thoughts or feelings.
>
> (p. I83)

He further describes the behaviour of the neurotic as relatively insatiable, driven, endlessly repetitive and relatively unresponsive to pleasure, pain or logical argument. Not only could he be describing an MBD child, but he is describing in terms very closely allied to Wender's (I97I) explanatory postulates discussed earlier ("decreased experience of both pleasure and pain" and a "generally high and poorly modulated level of activation").

As regards other theories of psychopathology, many of them conceptualize severe psychopathology in terms of

I. dependency-depression-orality, and

2. ego-strength

Wender postulates similar dimensions in his theorizing. He sees the postulated underactivity of the pleasure-pain system and the reinforcement system as leading to

> (I) disordered interpersonal relations characterised behaviourally by excessive object-seeking and diminished object attachment, and subjectively by a sense of instability; and (2) a weakness of 'ego strength' whose specific attributes are deficient inhibitability and an inability to postpone gratification, to withstand frustration, or to stay impulses.
>
> (p. 161)

Wender's second postulated malfunction - in the activation-inhibition system - would lead to a further inroad into "ego strength"— it would make abstract, planful and detached thinking (secondary process thinking) extremely difficult.

The evidence adduced thus far for the relationship between MBD and later psychopathology is far from conclusive. A number of issues emerge from the foregoing discussion, and it is these issues (as well as many others which are not relevant for this particular study) which future research needs to clarify:

1. If MBD is to be a distinct and definable nosological category, its area of concern, and that of other psychiatric/psychological/medical/educational classifications must not overlap. Or,
2. is MBD to be regarded <u>not</u> as a distinct and definable nosological category, but as an early "symptom" of later psychiatric/psychological/medical/educational disorders?
3. Is it possible for such diverse disorders as schizophrenia, neurosis, personality disturbances and sociopathy to have a common root? This issue is further confounded by the fact that a number of these disorders e.g. "schizophrenia", are still in the process of definition themselves.
4. What is the minimal number of necessary and sufficient "symptoms"

which allow for a diagnosis of MBD?

5. Does Wenders attempt to clear the diagnostic confusion by formulating a global theory represent a step forward, or a step back to the stage of gross classifications?

3.7 Psychosocial maladjustment

As the immature brain is still flexible, other parts can take over the functioning of dysfunctioning areas. Nerve pathways can be retrained, and, as maturing progresses, the child can learn to conform socially, to work purposefully and to become more calm and attentive. However, these processes do not occur automatically.

Sustained assistance as early in life as possible is essential. Prevention of the sense of defeat and bitterness that accompany repeated failure may prevent the development of crippling attitudes and reactions in later psychosocial adaptations (Zieman, I969). As Birch (I964) comments:

> We never see an individual whose disturbed behaviour is a direct consequence of his brain damage. Instead, we see individuals with damage to the nervous system which may have resulted in some primary disorganization, who have developed patterns of behaviour in the course of atypical relations with the developmental environment, including its interpersonal, objective and social features. The behavioural disturbances of children who come to our notice are developmental products and not merely manifestations of a damaged portion of the brain. (p. I6)

A diversity of psychological models and theories have been propounded to account for the psychosocial maladjustments, the "atypical relations with the development environment" characteristic of most MBD children:

I. Rappaport (I964) uses a model based on ego psychology. He focusses on the effect of brain damage on ego development and total life adjustment. He stresses that behavioural and learning disturbances are not solely the result of damaged tissue, and therefore, not necessarily irreversible. Disturbed parent-child

relationships may be a prominent feature of the MBD child's life and may contribute further to interference with ego-development. Rappaport points out that inadequacy in motor areas and fine visual-motor co-ordination impedes such ego functions as mastery, integration, reality testing and impulse control.

2. Lewin (I935) postulates that hyperactivity reflects the blockage of goal-directed behaviour by a barrier. An individual who tries in vain to solve a problem may become extremely frustrated and, eventually decide to give up the goal. One of the consequences of this conflict between doing and not-doing is an increase in restless movements. Children observed in such conflict-arousing situations have been shown to increase their activity level markedly. Lewin's work gives rise to the following hypothesis: Because the constellation of problems associated with MBD may interfere with success in school and acceptance by others, a certain degree of the hyperactivity observed in afflicted children in stressful situations may stem from frustration.

3. Bijou and Baer (I96I) theorise in terms of operants and respondents. They see the labile affect, anxiety, impulsivity and other emotional problems often accompanying MBD as consequences of respondent conditioning. Perceptual-motor problems are seen as examples of inadequately established operant behaviours.

4. Anthony (I973) proposes that in addition to the classical psycho-analytic division of the mind, there is a fourth compartment containing:

I. the body representation that documents over developmental time the child's discovery of his body, the effects of any damage or deficiency in it, and his evolving concept of it,
2. the child's discovery of 'self' and the gradually evolving distinction between 'self' and 'non-self',
3. the representation of relevant others, and the interaction between 'self' and 'others',
4. the child's growing conception of his immediate world and the universe in general, together with the gradual and segmental

construction of the reality 'out there'.

Anthony believes that

> In MBD children, the idea of body damage and deficiency may be prominent and linked to feelings of inferiority. Persisting confusion between the 'self' and the 'non-self' may also dominate the picture, resulting in egocentric functioning. The internal 'society of objects' may be primitively represented in the dichotomous terms of good-bad, loving-hating, accepting-rejecting, protecting-punishing and so forth ... The child's appraisal of reality is a function of his developmental stage, referring both to his internal or psychic reality as well as to his external reality. What develops within the 'fourth compartment' is therefore a dynamic epistemology concerning the relationships between the body, the self, the people and things, and a developmental epistemology of how conceptualizations of body, self, people and things slowly evolve in recognizable stages over time.
>
> (p. 57)

(This "fourth compartment" concept could apply equally well to schizophrenia. Once again, the relationship between MBD and schizophrenia arises.)

All these theories have practical implications which still need to be tested out for the purposes of remedial education.

3.8 Academic Maladjustment

The academic maladjustment exhibited by most MBD children (usually referred to a "Learning disability") has also been the subject of a number of different theories:

I. Kephart's (I97I) theory of perceptual-motor learning cites three major stages: (i) the practical, (ii) the subjective and (iii) the objective. Development is seen primarily in terms of competencies, rather than in terms of age-appropriate behaviours.

   Conceptual development, for example, can be no more adequate than the accuracy and completeness of the perceptual experience

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   Conceptual development, for example, can be no more adequate than the accuracy and completeness of the perceptual experience

upon which it is based. For learning to occur, all perceptions must be matched to basic motor generalizations. During the practical stage, the young child develops motoric competence with respect to posture and the maintenance of balance. As this competence is achieved, the child becomes aware of spatial position, directionality and temporal sequencing. The subjective stage brings perceptual and motor knowledge more clearly into relationship with one another and into a relationship with the child himself. The objective stage is concerned with awareness and understanding of the total configuration of perceptual-motor experience. In Kephart's view, the MBD child fails to develop basic perceptual and motor competencies and consequently finds it impossible, without aid, to match perceptions with basic motor generalizations in order to achieve an integrated world view.

2. Hewett (1968) postulates that a child with a behaviour and/or learning problem may be described in terms of his deficits across the following six behavioural levels: attention, response, order, exploratory, social and mastery. The first three are concerned with the learning process and with noticing, doing and following directions. The last three are concerned with the content of learning, for example, amassing a thorough and accurate knowledge of the physical properties of the environment, gaining proficiency in acquiring approval and avoiding disapproval, and mastering cognitive skill in language and general academia. The child can be described in terms of his strengths and weaknesses on each level. Although Hewett's postulates are not always clearly spelled out, they have the advantage of being applicable to all children. MBD children can therefore be ranged within the same framework as the normal, subnormal, and gifted child.

3. Quay (1968) suggests that three parameters can be used to describe all exceptional children: (i) input, (ii) response and (iii) reinforcement. Input functions include acuity, orientation perception and failure to store. Response functions include dexterity, orientation, organization and delay. Within the reinforcement parameter, acuity, orientation, effect, delay, amount and ratio are central functions. An MBD child may experience difficulty

in learning because of difficulty in orientation and perception within the visual, auditory and tactile modalities on an input level, motor problems in all response functions, and orientation disturbances in all reinforcement modalities.

4. Behaviour modification theory also makes its contribution to the understanding of MBD. Gagne (I970) lists eight types of learning: (i) signal learning, (ii) stimulus-response learning, (iii) chaining, (iv) verbal association, (v) discrimination learning, (vi) concept learning, (vii) rule learning and (viii)problem solving. The tasks that all children, including those with MBD, are confronted with require proficiency in one or more of these eight types of learning. Thus given any child and any task, the situation can be described in terms of child proficiency and task demand.

5. Piaget's (I950, I955, I969, I970) theories make a further contribution to the understanding of MBD. A child may experience difficulties shortly after birth when its interactions with the physical environment are restricted or distorted because of capacity-based limits in perceptual and motor areas. During the sensorimotor period, the process of assimilation - the ability to handle new situations by building on previous experience - may be faulty from the very first. Similarly, the process of adapting to new demands (accommodation) might be affected very early in the developmental sequence. Severely emotionally disturbed children, as well as those with sensorimotor deficiencies have been found to be quite inadequate in their exchanges with the physical world. Later development of thought processes appears to be adversely affected by this inadequacy. Within Piaget's framework, the behaviour of the MBD child may be seen in terms of stages of cognitive development. Many MBD deficiencies may be explained as failure to profit from, and subsequently master experiences with the physical world. At this point, Wender and Piaget concur.

6. A number of workers focus on difficulties in figure-ground and spatial relations. Werner (I954) hypothesises that distractibility

as well as fixation, isolation of function as well as diffuse spread, and perseveration as well as lability represent disturbances in the "figure-ground syndrome". Francis-Williams (1970) hypothesises that difficulties in learning the basic school subjects, reading and arithmetic, arise mainly from delayed or distorted development of spatial ability- i.e. disorders in both perception and the manipulation of spatial relationships. Strauss (1947) too places great emphasis on the difficulties arising from figure-ground disturbance. Like Werner, he sees in this an explanation of the restlessness and distractibility of MBD children. He holds that those children whose cerebral damage makes it difficult for them to distinguish figure from background have difficulty also in concentrating on what is significant, and are consequently distracted by all the varying sights and sounds that impinge on their senses. These children therefore cannot easily keep their thinking in focus and they find it difficult to construct and retain a stable perceptual world.

7. Lehtinen (1955) focusses on the failure to integrate information from both the perceptual and the motor systems, as well as the failure of the visual perceptual processes to provide substantial and clearly structured patterns for the motor actions to follow. She suggests that much of the awkwardness of the MBD child is due to this failure in integration, resulting as it does in unevenness in functioning and an unstable and uncertain hold on the perceptual world.

It seems to be characteristic of this problem that for as long as its exact nature remains unspecified, it will evoke a multitude of explanatory theories and speculations. All the above theories focus on <u>aspects</u> of the total problem. What is common to all of them is the fact that some basic function(s) is/are dysfunctional. This leads to more and more complicated patterns of aberrant interaction within the internal and external environments. Any effective remedial programme must therefore extract basic functions, or competencies or skills on which the later academic and social edifice is built and then elicit those patterns of interaction or integration of these functions which then make for improved psycho-

social and academic functioning. Any effective remedial programme must blend what is relevant of each of the developmentally-oriented, competency-based and behaviour-modification approaches in order to be as comprehensive as possible. In lieu of any single, satisfactory, all-embracing theory or model this approach would appear to be the most practical one for the present. This argument is supported further by the fact that the ongoing problems of MBD children and adolescents cannot be shelved until there is a satisfactory delimitation of this area. Furthermore, if there is a causal bond between MBD and psychopathology, any remediation of the one might beneficially affect the other.

3.9 The socio economic variable

Psychosocial and academic maladjustment in school children may be related not only to MBD, but also to the socio-economic variable. The Grade I population is far from homogenous as regards this variable. It is generally conceded that many children of low socio-economic status are "socially disadvantaged" (Gordon, 1968) or "culturally deprived" (Bereiter et al, 1965; Gray and Klaus, 1965; Hunt, 1968). Cultural deprivation is defined by Hunt (1965) as a

> ... failure to provide an opportunity for infants and young children to have the experiences required for adequate development of those semi-autonomous central processes demanded for acquiring skill in the use of linguistic and mathematical symbols and for the analysis of causal relationships ...
>
> (p. 323)

Piaget (1952) stressed the role of such experience as one of the essential ingredients in the development process. Spitz (1965), Goldfarb (1943) and Bloom (1964) demonstrated the detrimental effect of early, persistent experiential deprivation on later social, emotional and academic adjustment. The affects of cultural deprivation may be seen to be analogous in many ways to these experimentally demonstrated effects of experiential deprivation in infancy. After having investigated the histories of low socio-economic status children, Gordon concluded:

> In school, these children show disproportionately high rates of social maladjustment, behavioural disturbance, physical disability, mental subnormality and academic retardation.
>
> (1968, p. 382)

Whiteman and Deutsch (1968) studied first-grade children from schools varying in socio-economic status. They found that social disadvantage occasioned by conditions associated with poverty is associated with cognitive and learning deficits. Socially disadvantaged children have been found to be inferior to non-disadvantaged children in their use of verbal symbols to represent and interpret their feelings, experiences and objects in the environment (Bernstein, 1961; Davis, 1963); in their conceptual development (Ausubel, 1963; Deutsch, 1963; Gordon, 1964; Hillard, 1957; Reissman, 1962); in their arithmetic concepts (Montague, 1964); in perceptual styles and habits (Reissman, 1962) and in auditory discrimination (Deutsch, 1964). Language deficits in the disadvantaged school-age child are well documented (Jensen, 1968; Whitman and Deutsch, 1968).

Buhler (quoted by Lawton, 1968) found that children of low socio-economic standing were generally retarded in development and particularly retarded linguistically. When children of different socio-economic standing are compared, the role of IQ differences must necessarily be raised. Working with American Negroes and Caucasians, Pasamanick (1953) found that with socio-economic and health factors controlled, Negro and White children did not differ in mental development. It is apparent that deprived children have essentially the same stages of mental development as non-deprived children.

Piaget's work on the origins of intellect (1952) has indicated that mental structures or schemata accommodate to the variety of stimulation and problems posed by the environment. However, accomodation can only occur when there is a match between the internal schema and the external task; only in this case will the internal structure assimilate the environment.

If the environment poses problems which are too difficult, the mental structures will fail to assimilate and accomodation or mental growth will not occur. Frustration and withdrawal may result. If the problems are too easy, boredom and disinterest will prevail. During the life-period of 6-10 years, schemata which are the foundation of academic achievement are being strengthened and integrated. If the match between schemata and environment is persistently poor, as in the case of a culturally deprived home and community, there will be little mental growth, and consequent difficulty with academic tasks. Such difficulty may impair the child's self-confidence in such a way that learning becomes even more difficult and unrewarding. A lowered achievement level may then feed back in such a way that development of original abilities is even slower. This slower development results in lowered achievement which may then precipitate loss of self-confidence. Waning self-confidence then feeds back on need for achievement, and the vicious cycle runs its course. Add to these psychodynamic forces the devaluations brought about by poverty prejudice and the lack of proper equipment and educational materials in the poverty-stricken schools, and the process may be accelerated. Without remediation, early deficits become cumulative.

Whiteman and Deutsch (1968) point out that to the degree that intervention procedures are able to provide compensatory experiences, such procedures may be successful in reversing or ameliorating cumulative deficits. However, the question to be raised is: When should intervention begin? The traditional period for educational intervention has been the nursery school years. The underlying rationale for this choice was that left in a deprived environment until he enters primary school, the child has several years to build up response-habits that may interfere with school learning. In recent years a trend has developed towards beginning educational intervention earlier than primary school, and to base intervention procedures on those research-revealed deficits associated with the disadvantaged. Some researchers (Bayley, 1965; Goldstein 1965; Kennedy et al, 1963) believe that intervention should begin soon after 18 months because it is during this period that structures of intelligence begin to emerge. Irwin (1948) found that environmental differences begin to make a difference

with respect to language development after 18 months. Intervention at such an early age would require the training of mothers to interact with their babies in such a way that the proper foundation for cognitive and affective development is laid. Such training would involve tremendous expenditure of time and money. In the long run, it appears to be the best solution. In the short term, a more efficient solution would be to involve those key environmental figures who are involved with many children simultaneously. The nursery school teacher is one such figure, but nursery school attendance is not compulsory in this country, so all children would not be reached. The next best key figure is then the Grade I teacher, as primary school attendance is compulsory for all White children.

In this context, programmes of remedial education have a dual function: they are remedial in that they attempt to fill social, cultural, and academic gaps, and they are preventive in that they are aimed at dealing with deficits before they become cumulative.

3.10 Aims

The study aims

1) to determine whether the training programme can enhance motor, perceptual, conceptual and social functioning in a group of primary school children,
2) to determine whether Grade I teachers can act effectively as preventive agents,
3) to assess whether primary school children from upper- and lower socio-economic classes differ in their motor, perceptual, conceptual and social functioning upon entering the first Grade and
4) to assess whether these children respond differentially to the training programme.

3.11 Hypotheses

1) Primary school children in the low and high socio-economic groupings will improve in terms of their functioning on the Valett Developmental Survey and the Banham Maturity Level for School Entrance and Reading Readiness as a function of the training programme.
2) Primary school children in the low socio-economic grouping will

exhibit poorer functioning than their high socio-economic counterparts on the Valett Developmental Survey and the Banham Maturity Level for School Entrance and Reading Readiness prior to and after the administration of the training programme.

CHAPTER 4

METHOD

4.1 Subjects

4.1.1 The pupils

The subjects of this study were White male and female first-time and repeat Grade I scholars. There were 6 repeats in a total sample of 89 children, 2 in the experimental group, and 4 in the control group. Subjects were divided into two English-medium primary schools, catering for different socio-economic areas: an upper- and a lower-class area. Before the study commenced, 12 school principals were asked to rate the schools in their vicinity as catering for upper-middle or lower-class children. The two schools which the majority rated as "upper-" and "lower-class" schools were then chosen for the study. There was 75% agreement on the upper-class school, and 80% agreement on the lower class school.

Two Grade I classes from each school were utilised, one class for the experimental group, and one class for the control group. The experimental class from the high socio-economic school is henceforth referred to as EH. The control class from the same school is referred to as CH. The experimental class from the low socio-economic school is referred to as EL and the corresponding control class is referred to as CL. The experimental group numbered 43 pupils in toto: 21 from the upper-class school, and 22 from the lower-class school. The control group numbered 46 pupils in toto: 24 from the upper-class school, and 22 from the lower-class school.

The average age of the experimental group children was 6 years 1 month (ranging from 5 years 7 months to 7 years 3 months). The average age of the control group children was 6 years 6 months (ranging from 5 years 8 months to 7 years 6 months). As a

result of the nature of the selection procedure for high and low socio-economic schools, extensive matching of children on a one-to-one basis was not feasible. Consequently, it was decided that a statistical form of control would be emp[illegible]ed as an imperfect, but unavoidable alternative to experimental matching (see Data analysis). Thus the two groups were not matched for intellectual status. Nor were the two groups matched on nursery school attendance. The majority of upper-class children (90%) had attended a nursery school for a minimum of one year, as compared with only 9% of the lower-class children. In the lower- class sample, there were 7 immigrant children, with a poor understanding of English. The corresponding number in the upper-class sample was 3.

4.I.2 The teachers

Both primary schools employed only two Grade I teachers respectively. The principal of each primary school made a random choice of which teacher was to be assigned to "condition A", and which was to be assigned to "condition B". Thereafter, the two "conditions" were described to him as "the experimental condition" and "the control condition". The following personal data were collected for each teacher:

TABLE I. PERSONAL DATA OF THE FOUR TEACHERS

PERSONAL DATA	Lower-class school		Upper-class school	
	Experimental	Control	Experimental	Control
Sex	Female	Female	Female	Female
Marital status	Married	Married	Married	Single
Age	27	33	6I	25
Highest Qualification	Teaching Diploma	Teaching Diploma	B.A.	Teaching Diploma
No. of teaching years	6	I2	38	4
Nature of classes taught	GrI-StdI	GrI-StdI	GrI-StdI	Grade I
No. of years at the present school	4	3	6	5

Inspection of Table I reveals that all teachers were female, and all had previous experience in teaching Grade I children. Their ages ranged from 25 - 6I years. Three of the four teachers participating in the research were married. Number of teaching years ranged from 4 to 38.

From the foregoing, it is evident that it was impossible (from a practical point of view) to match the teachers on personal background. The most important unmatched variables were:

I. Marital status,
2. number of years spent teaching and
3. (possibly) age of teacher.

Any one or combination of these variables might influence the results.

As it was impossible to match the teachers on personal background, a further screening device was introduced at this stage to assess the current status of each teacher as regards "cognitive flexibility". Ryans et al (I963) hypothesised that cognitive flexibility is a variable critical to teacher effectiveness. "Cognitive flexibility" refers to the teacher's ability to think on her feet, to adapt teaching objectives, content and method to the changing conditions of the classroom. These authors used the Rorschach as one measure of cognitive flexibility, in the manner described by McArthur (I954) as typical of those clinicians who were able to make the best predictions about an individual's behaviour. Following this approach each teacher in the present study was rated on the following Rorschach elements associated with the Flexible-Rigid dimension for Personal Cognitive Characteristics (after Ryans):

TABLE 2/.....

TABLE 2. RORSCHACH ELEMENTS ASSOCIATED WITH THE FLEXIBLE-RIGID DIMENSION FOR PERSONAL COGNITIVE CHARACTERISTICS.

FLEXIBLE	RIGID
$R \geq 25$	$R < 25$
$F\% \leq 50$	$F\% > 50$
$70\% \leq F+\% < 90$	$F+\% > 90$
W's are W++ and W+	W's are Wm and Wv
Vista	No vista
Content varied	$A\% > 50$, few categories
$m < 3$	$m \geq 3$
Shading present	Shading absent
FC, CF, M, FM present	FC, CF, M, FM absent or undeveloped

Ryans et al hypothesised further that cognitive attitude towards the student could be assessed by the interaction of the characters in the human movement responses (M) on the Rorschach, and by the interaction of the "heroes" in the stories told to the following TAT cards: I, 4, 6BM, I4, 7BM. (This combination of cards, together with the instructions to "write down the stories" is known as the Visual Impressions Test, or VIT). Each teacher in the present study was therefore rated on the following (after Ryans):

TABLE 3. RORSCHACH AND VIT ELEMENTS ASSOCIATED WITH THE FLEXIBLE-RIGID DIMENSION FOR COGNITIVE ATTITUDE TOWARDS THE PUPIL.

FLEXIBLE	RIGID
M interactions are on an equal basis	M interactions condescending
VIT heroes responsive to others	VIT heroes "cue" others out
VIT heroes see others as equal human beings	VIT heores look down on others

Ryans et al administered the psychological tests to I8 teachers. They then collected independent observational ratings of in-classroom

behaviour (using I3 scales assessing the flexible-rigid dimension). A Spearmar Rank Correlation Coefficient was computed for the two sets of data and $p<,0I$ was found. The hypothesis that effective teaching is related to cognitive flexibility was confirmed and Ryans et al therefore concluded that flexible-rigid behaviour in a teaching situation could be inferred from responses to the Rorschach and VIT.

As the present study introduced the teacher to theories, methods and materials which, for the most part, were novel, (i.e. not included in their original teacher-training curriculae) the dimension of cognitive flexibility-rigidity as regards a) personal cognitive characteristics, and b) cognitive attitude towards the pupil, would appear to be a pertinent one. For this reason, the four teachers were further matched on the flexibility-rigidity dimension.

4.2 Procedure

Each teacher was rated on the Rorschach and VIT, as described above. This study adopted a test-retest design. The same test battery was administered to all subjects before and after the administration of the training programme. All scores obtained on the first administration were referred to as "Pre-test" scores, while all scores obtained on the second administration were referred to as "Post-test" scores. Before the training programme was introduced, a meeting was held with all four teachers. They were instructed in the use of

I. the Valett Developmental Survey (to be described in the next section),
2. the Banham Maturity Level for School Entrance and Reading Readiness,
3. the WPPSI (Wechsler Pre-school and Primary Scale of Intelligence).

The two teachers in the experimental group were then thoroughly briefed on the theoretical underpinnings, methods and materials incorporated in the training programme.

All four teachers were requested to carry out a brief pilot

study before the experiment actually commenced, in order

I. to ascertain the time required to administer the battery of tests in a single session,
2. to become familiar with the administration of the tests.

After each teacher had tested three children (who were not members of her class) the unanimous report was that the testing-session was unreasonably and impractically long. As each teacher had a minimum of 20 pupils to test within a given time period, the alternative of testing one child on two separate occasions had to be ruled out. As the test giving least information over a broad range of areas, the WPPSI was then withdrawn from the test battery.

At the beginning of the first term of the new school year, each teacher was requested to send home with each child a Banham questionnaire. This questionnaire was to be filled in by the parents and returned to the teacher. Where parents were unable to fill in the questionnaire (because of language difficulties), the teacher was requested to do so.

As the first term of this particular school year comprised I6 weeks, each teacher was requested to carry out the initial testing of all children within the first three weeks. Thereafter, for a period of ten weeks, the control group continued with the Grade I curriculum, while the experimental group continued with both the Grade I curriculum and the training programme. Teachers in the experimental condition were requested to make detailed daily notes on the progress of those children who experienced most difficulty and also to comment on the efficacy of the programme. The daily activities of the programme take a set time to run through. Teachers were asked to present these activities in one continuous session, to note which children experienced difficulties at which points, and then, after the session was complete, administer the "special training exercises" (given at the end of the Appendix) on an individual basis.

All scoring of the Banham questionnaire and the Valett Developmental Survey was done by E. The results of both tests were fed back to all teachers. Teachers in the experimental group were geared to note any unevenness in the scoring profiles of their pupils and then to focus, using the special training exercises, on the areas of poorest functioning for each individual.

It is usual procedure for Provincial Health Officers to visit schools in the early part of the year. If both schools were visited within the first term, the results of the health examinations would be incorporated into the training programme. However, only one of the schools received a visit during the research period and so this source of information was not utilised.

In the last three weeks of the school term, all teachers were requested to administer the Valett Developmental Survey again to all children, and to send the Banham questionnaire home with instructions to parents to "judge the child as you see him now". After all the tests had been scored by E, a feedback session was arranged with teachers in the experimental group.

4.3 Apparatus and test materials

4.3.I The Rorschach and VIT have already been discussed.

4.3.2 The Banham Maturity Level for School Entrance and Reading Readiness is a questionnaire which consists of 25 behaviour items which are checked as either "true" or "not true" of the child. Included in this checklist is an index of reading readiness. The items were selected from the following well-established developmental scales: the Gesell Developmental Schedules, Vineland Social Maturity Scale, Oseretsky Tests of Motor Proficiency, Goodenough drawing test, and others. The questionnaire consists of brief statements of the behaviour and accomplishments of the average six-year-old, and is intended to be used

as an aid · the preliminary screening of children prior to, or immedi ,· upon, entrance into primary school. By using this device, a measure of the child's developmental level is attained. The behavioural items are grouped into the following five categories in order to highlight those areas in which the individual child is immaturely developed: bodily co-ordination, eye-hand co-ordination, speech and language comprehension, personal independence and social co-operation.

4.3.3 The Valett Developmental Survey of Basic Learning Abilities comprises seven subtests which assess those developmental tasks prerequisite to more formal learning: motor integration and physical development, tactile discrimination, auditory discrimination, visual-motor co-ordination, visual discrimination, language development and verbal fluency, and conceptual development. The child is asked a question, or is instructed to perform in a certain way, and his answer or performance is then rated against the norms for his age. These norms are drawn from the Vineland Social Maturity Scale, Kephart's work (1960), the work of Valett (1963), Haeuserman (1958), Binet (1911), Gesell (1940, 1946), the Detroit Tests of General Aptitude, the Frostig Programme for the Development of Visual Perception, the work of Wechsler (1949), the Wide Range Achievement Test, the Bender-Gestalt Visual Motor Test and the Nebraska Test of Learning Aptitude. The Valett Developmental Survey provides the teacher with an indication of the child's basic learning needs. The scoring system is such that each increase in score represents increased mastery of the tasks being measured.

4.3.4 The rationale underlying the training programme drawn up by E was discussed in the "Introduction". This training programme draws not only on the work of those authors mentioned in connection with the Banham questionnaire and the Valett Developmental Survey, but also on the work of Isaacs (1950), Piaget and his followers (1950, 1955, 1969, 1970), Johnson and Myklebust (1967), Saphier (1973), Gallagher (1973), Haring and Ridgway (1973), Elkind and Deblinger (1969), and Bateman (1973).

The programme is reproduced in Appendix A. Where apparatus was required for a specific exercise or task, (e.g. a walking board, balls, beads, plasticine) it was easily obtainable either from the teacher's home, or the school store-room. If the school did not possess the necessary equipment, it could be bought inexpensively, or built by the school handyman.

CHAPTER 5

RESULTS

5.1.1 Data Analysis

The scores of the two Grade I teachers in the experimental group were compared with the scores of the two teachers in the control group on the Flexible-Rigid Dimension for Personal Cognitive Characteristics. A x^2 test for two independent samples was utilised for this purpose. On the Flexible-Rigid Dimension for Cognitive Attitude Toward the Pupil, the scores of the teachers in the experimental group were compared with the scores of the teachers in the control group, using the Fisher Exact Probability test (Siegel, 1956).

Data obtained before and after the administration of the training programme were analysed by means of a mixed design three-factor analysis of variance with repeated measures on one factor. Separate analyses were performed on each of the following dependent variables:

1) Summated scores on the Valett Developmental Survey (Appendix B table 3);
2) Scores on the Motor Integration and Physical Development subtest of the Valett Developmental Survey (Appendix B, table 2);
3) Scores on the Tactile Discrimination subtest of the Valett Developmental Survey (Appendix B, table 3);
4) Scores on the Auditory Discrimination subtest of the Valett Developmental Survey (Appendix B, table 4);
5) Scores on the Visual-motor Co-ordination subtest of the Valett Developmental Survey (Appendix B, table 5);
6) Scores on the Visual Discrimination subtest of the Valett Developmental Survey (Appendix B, table 6);
7) Scores on the Language Development and Verbal Fluency subtest of the Valett Developmental Survey (Appendix B, table 7);
8) Scores on the Conceptual Development subtest of the Valett Developmental Survey (Appendix B, table 8);
9) Summated scores on the Banham Maturity Level for School Entrance and Reading Readiness (Appendix B, table 9);

10) Scores on the Readiness for School Entrance subtest of the Banham Maturity Level for School Entrance and Reading Readiness (Appendix B, table 10);
11) Scores on the Readiness for Reading subtest of the Banham Maturity Level for School Entrance and Reading Readiness (Appendix B, table 11).

In addition, statistical control of pre-test values was effected by means of analyses of covariance for a single treatment effect (Edwards, 1968) performed on the combined data for the two control groups and the two experimental groups. Data were combined by means of the $(\frac{EL + EH}{2})$ transformation for the two experimental groups, and the $(\frac{CL + CH}{2})$ transformation for the two control groups, where EL refers to the low socio-economic experimental group, EH refers to the high socio-economic experimental group, CL refers to the low socio-economic control group and CH refers to the high socio-economic control group. Analyses of covariance were considered to be appropriate only in relation to those interactions which were responsible for the support or refutation of Hypothesis 1. Separate analyses of covariance were performed on the combined data for the experimental and control groups on each of the following dependent variables:

1) Summated scores on the Valett Developmental Survey (Appendix C, table 1);
2) Scores on the Motor Integration and Physical Development subtest of the Valett Developmental Survey (Appendix C, table 2);
3) Scores on the Tactile Discrimination subtest of the Valett Developmental Survey (Appendix C, table 3);
4) Scores on the Auditory Discrimination subtest of the Valett Developmental Survey (Appendix C, table 4);
5) Scores on the Visual-motor Co-ordination subtest of the Valett Developmental Survey (Appendix C, table 5);
6) Scores on the Visual Discrimination subtest of the Valett Developmental Survey (Appendix C, table 6);
7) Scores on the Language Development and Verbal Fluency subtest of the Valett Developmental Survey (Appendix C, table 7);
8) Scores on the Conceptual Development subtest of the Valett Developmental Survey (Appendix C, table 8);
9) Summated scores on the Banham Maturity Level for School Entrance

and Reading Readiness (Appendix C, table 9);

10) Scores on the Readiness for School Entrance subtest of the Banham Maturity Level for School Entrance and Reading Readiness (Appendix C, table 10);

11) Scores on the Readiness for Reading subtest of the Banham Maturity Level for School Entrance and Reading Readiness (Appendix C, table 11).

5.2.1 Results of the comparison of teachers on the Flexible-Rigid Dimension

Teachers' scores on the Flexible-Rigid Dimension for Personal Cognitive Characteristics were compared, yielding $x^2 = 0,51$; $df = 1$; $p > 0,05$. Thus, teachers in the experimental group did not differ significantly from teachers in the control group on the Flexible-Rigid Dimension for Personal Cognitive Characteristics.

Teachers' scores on the Flexible-Rigid Dimension for Cognitive Attitude Toward the Pupil were also compared, yielding $p > 0,05$. Thus, teachers in the experimental group also failed to differ significantly from teachers in the control group on this aspect of the Flexible-Rigid Dimension.

5.2.2 Summated Scores on the Valett Developmental Survey

Although all groups exhibited improved functioning on the post-test (Pre-post: $F = 258, 77$; $df = \frac{1}{80}$; $p < 0,01$), the two experimental groups exhibited a greater increase between the pre-test and post-test than did the control groups (Pre-post x Condition: $F = 26, 52$; $df = \frac{1}{80}$; $p < 0,01$). These effects are demonstrated in Figure 1. A plot (Figure 2) of the combined data of groups EH and EL and those of groups CH and CL indicates a discrepancy between the pre-test scores of the experimental and control groups. Since this interaction is critical with respect to the first hypothesis, it was supplemented with an analysis of covariance performed upon the combined data. The adjusted mean for the experimental groups was 194, 22 and the adjusted mean for the control groups was 186, 31.

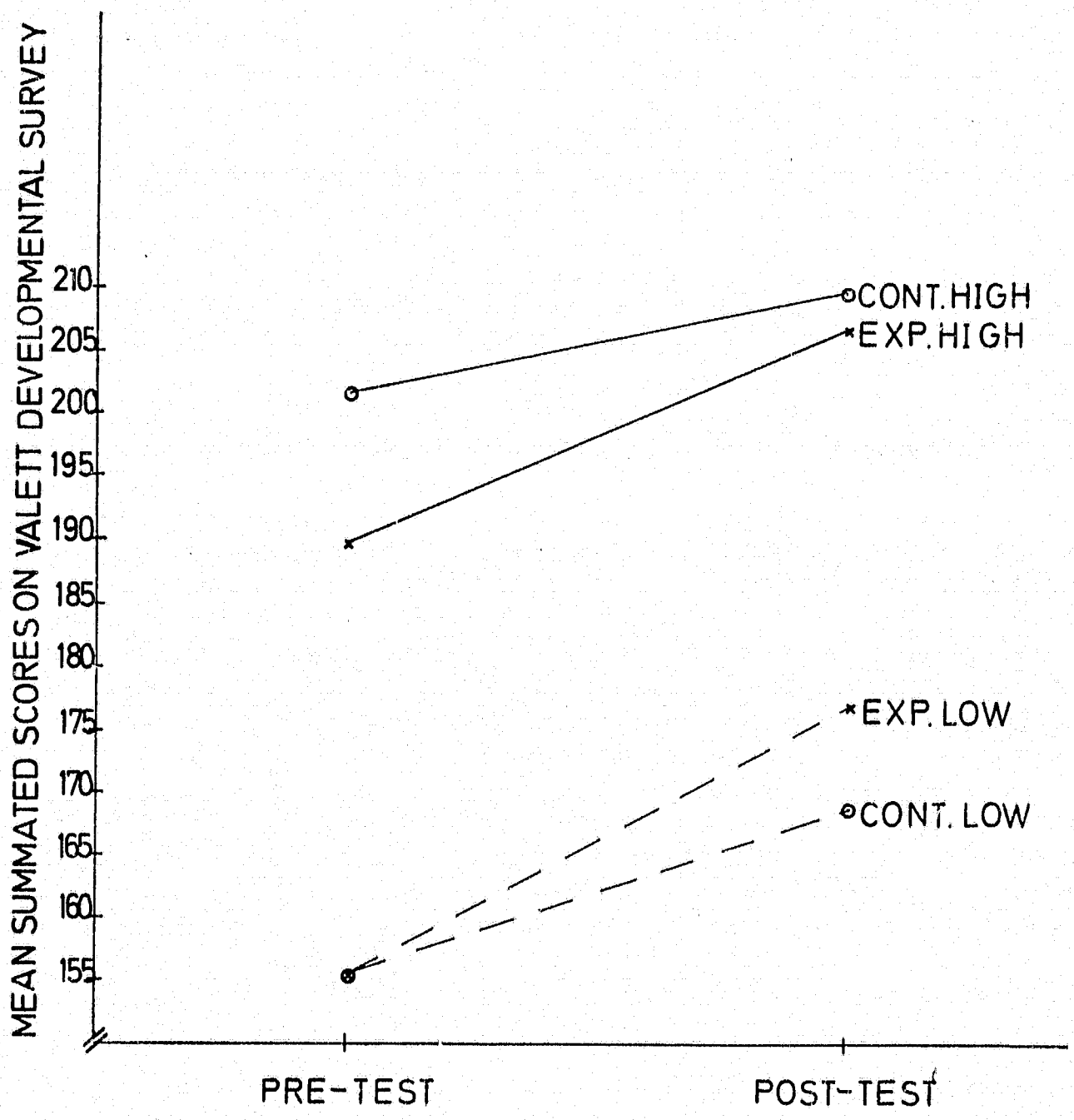


Fig 1. Comparison of the mean summated scores on the Valett Developmental Survey of groups EH, EL, CH and CL on the pre- and post-test.

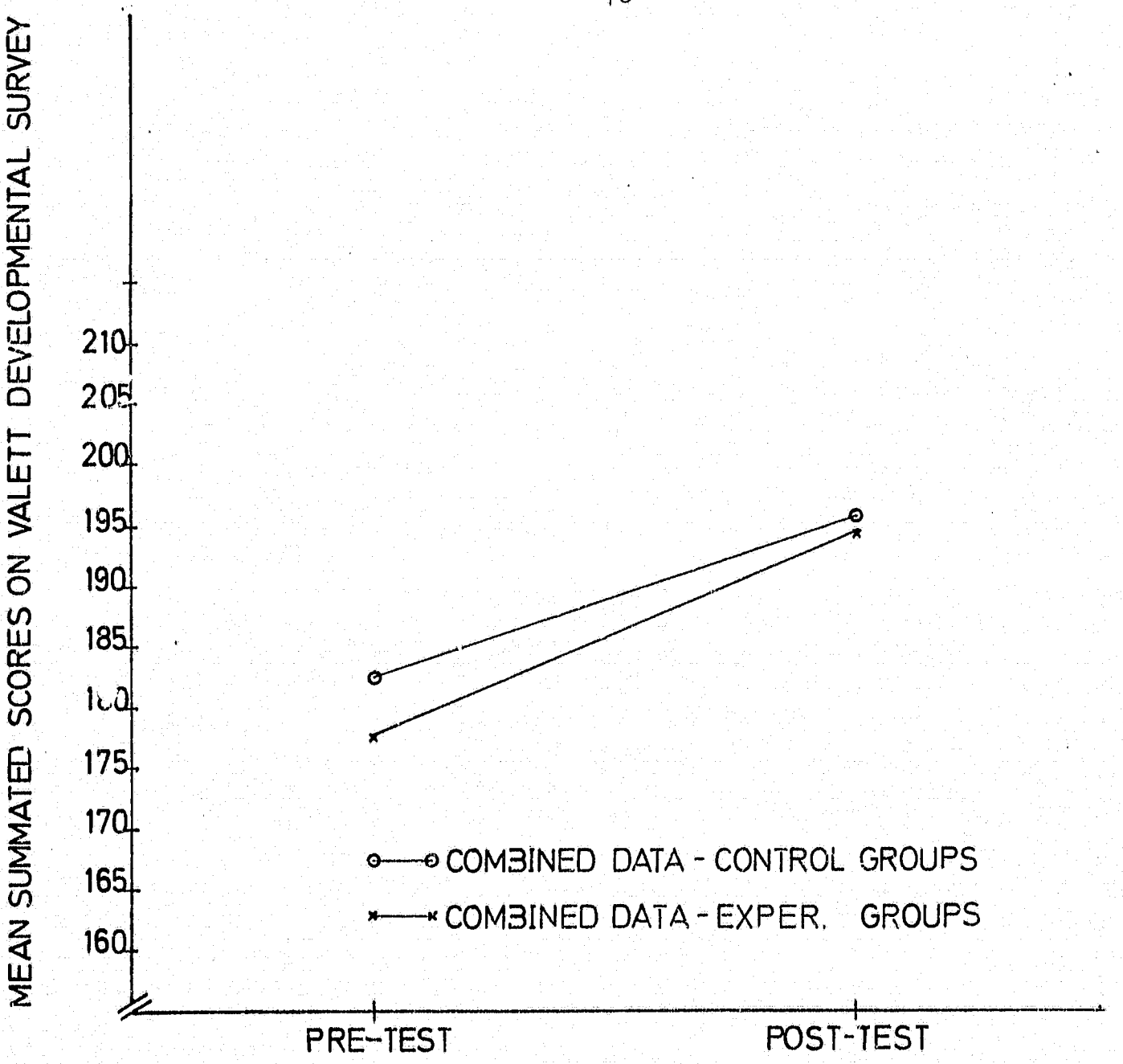


Fig 2. Comparison of the combined scores on the Valett Developmental Survey of groups EH and EL and those of groups CH and CL on the pre- and post-test.

The difference between these means was significant ($F = 19,54$; $df = \frac{1}{39}$; $p < 0,01$), suggesting that the differential rates of improvement were not attributable to pre-test score discrepancies. The Conditions main effect was not significant ($F = 0,20$; $df = \frac{1}{80}$).

The high and low socio-economic groups differed widely in terms of both pre- and post-test scores (Socio-economic: $F = 87,47$; $df = \frac{1}{80}$; $p < 0,01$). Although a significant Pre-post x Socio-economic interaction was obtained ($F = 4,51$; $df = \frac{1}{80}$; $p < 0,05$), suggesting a greater rate of improvement by the lower socio-economic groups, it is clear from Figure 1 that the post-test values for the lower socio-economic groups are considerably lower than those for the high socio-economic groups.

5.2.3 Summated Scores on the Banham Maturity Level for School Entrance and Reading Readiness

The pattern of results obtained for the summated scores on this test was analogous to that obtained on the Valett Developmental Survey in a number of respects. There was a general tendency for all groups to improve in terms of their functioning on the post-test (Pre-post: $F = 134, 75$; $df = \frac{1}{80}$; $p < 0,01$), although the two experimental groups exhibited a greater increase between the pre- and post-test than did the control groups (Pre-post x Condition: $F = 9, 17$; $df = \frac{1}{80}$; $p < 0,01$). These effects are demonstrated in Figure 3. As demonstrated in Figure 4, there was a discrepancy similar to that obtained on the Valett Developmental Survey, between the experimental and control pre-test scores. An analysis of covariance performed on the combined data of the experimental groups and the control groups indicated that the experimental groups adjusted mean (28, 75) and the control groups adjusted mean (27, 21) differed significantly ($F = 6,08$; $df = \frac{1}{39}$; $p < 0,05$), suggesting once again the differential rate of improvement between the groups was not attributable to the pre-test score discrepancy. The Condition main effect was not significant ($F = 0,63$; $df = \frac{1}{80}$).

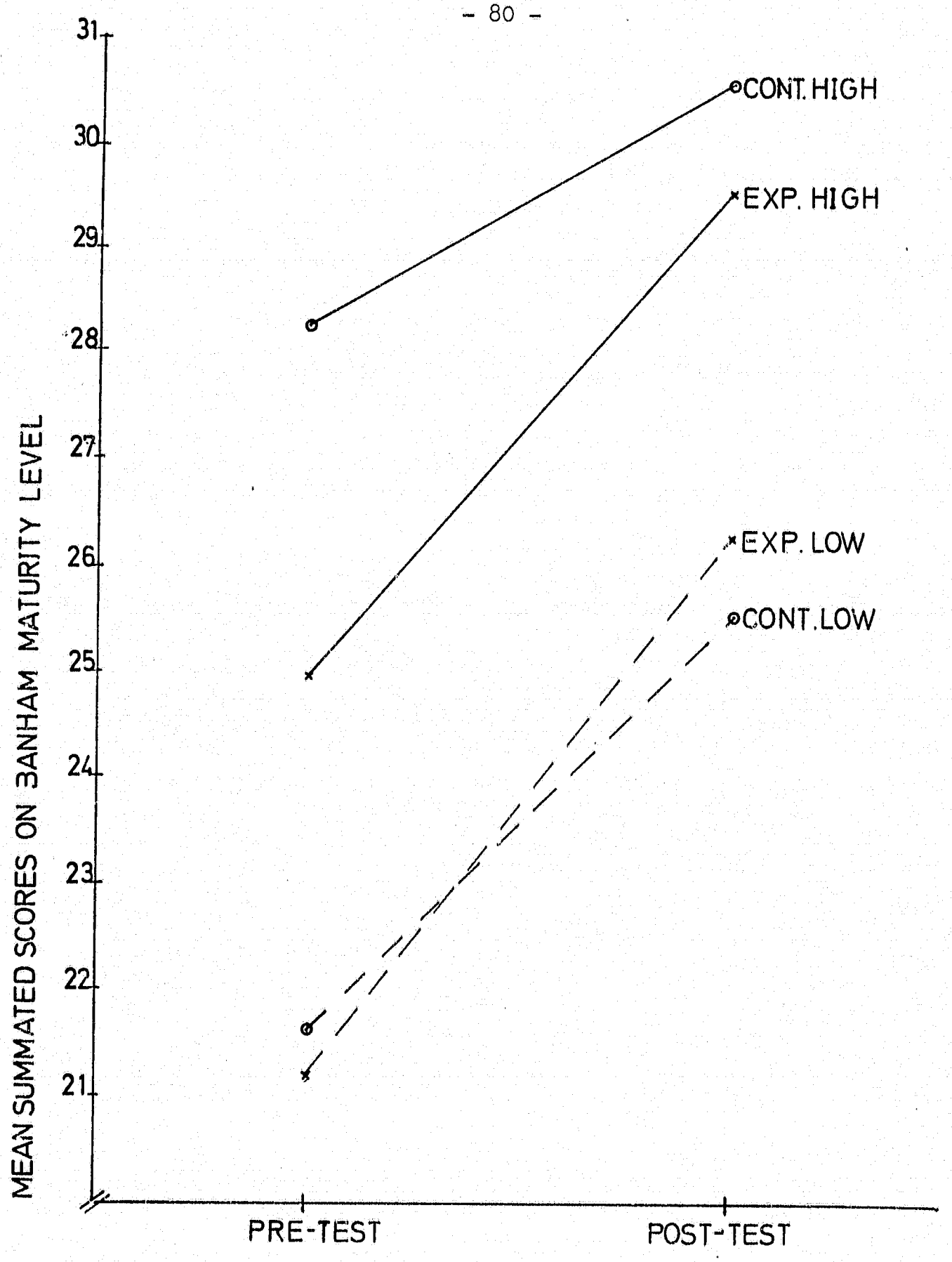


Fig 3. Comparison of the mean summated scores on the Banham Maturity Level of groups EH, EL, CH and CL on the pre- and post-test.

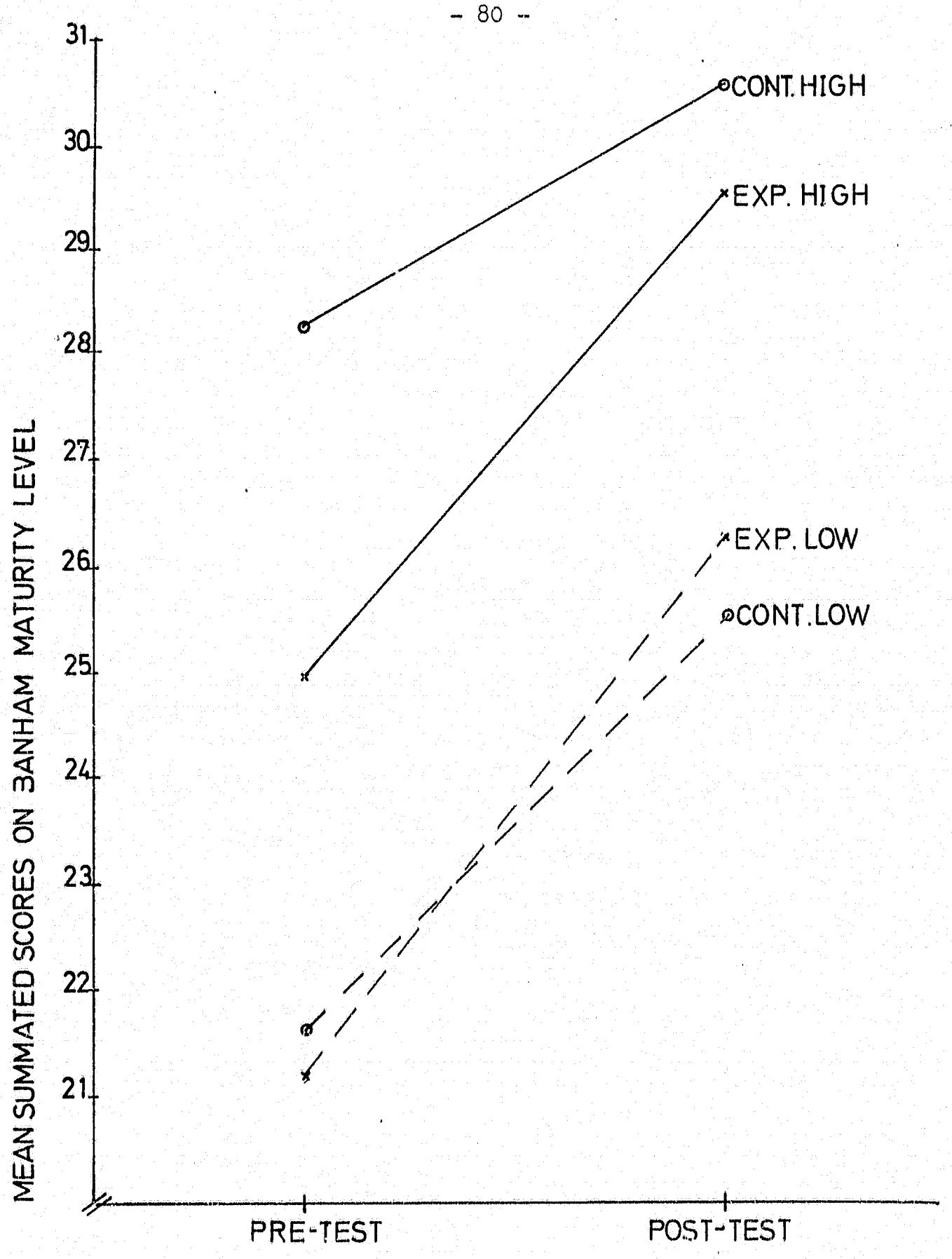


Fig 3. Comparison of the mean summated scores on the Banham Maturity Level of groups EH, EL, CH and CL on the pre- and post-test.

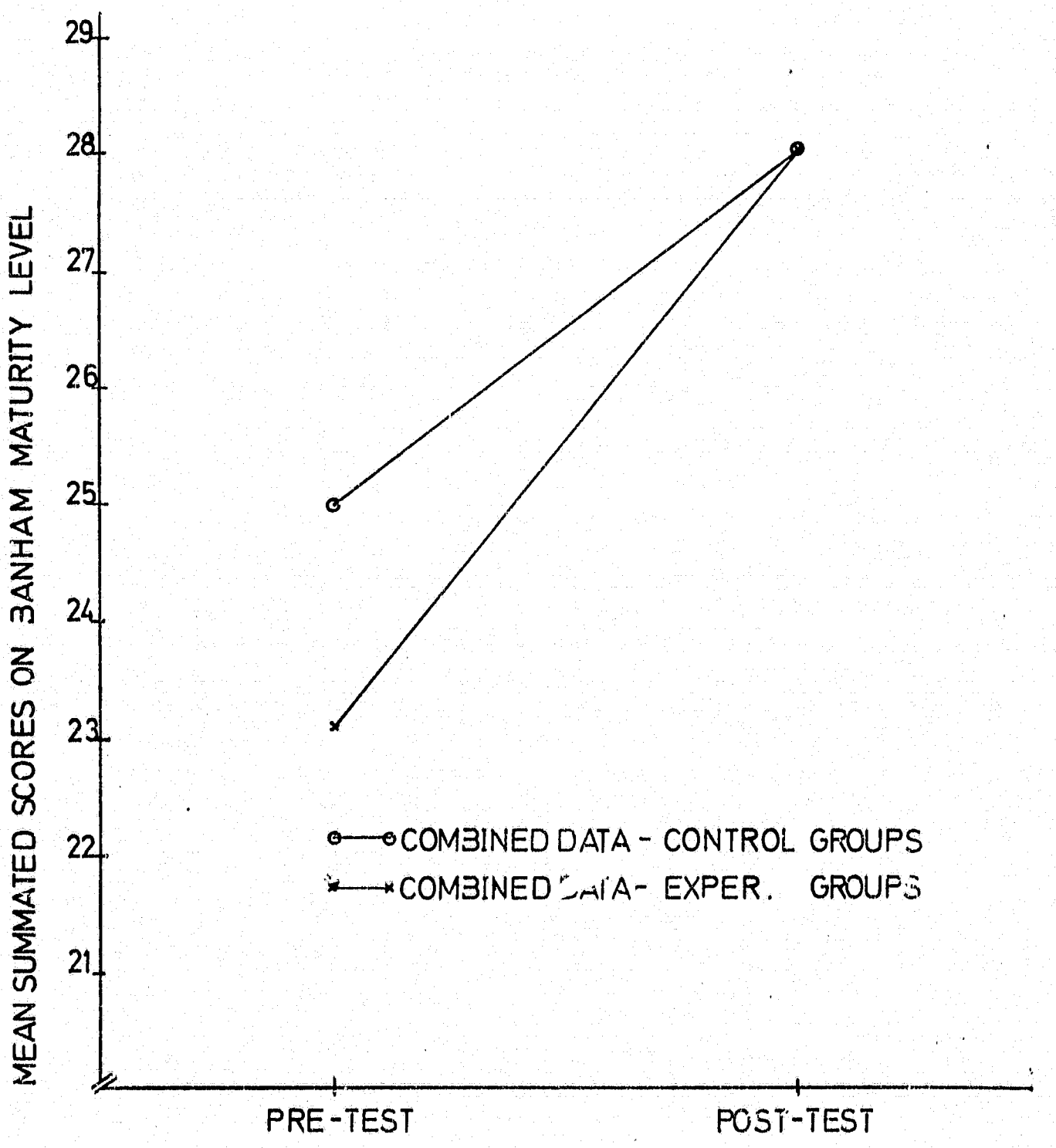


Fig 4. Comparison of the combined scores on the Banham Maturity Level of groups EH and EL and those of groups CH and CL on the pre- and post-test.

5.2.4 Scores on the Subtests of the Valett Developmental Survey

As would be expected, the results for the subtests of the Valett Developmental Survey exhibited a number of features in common with the results for the summated scores. As demonstrated in Figures 5 - 11, there was a general tendency for all groups to improve in terms of their functioning between pre- and post-test on the Motor Integration and Physical Development (Pre-post: $F = 5,37$; $df = \frac{1}{80}$; $p<0,05$), the Tactile Discrimination (Pre-post: $F = 103,84$; $df = \frac{1}{80}$; $p=0,01$), the Auditory Discrimination (Pre-post: $F = 18,26$; $df = \frac{1}{80}$; $p<0,01$), the Visual-motor Co-ordination (Pre-post: $F = 133,92$; $df = \frac{1}{80}$; $p<0,01$), the Visual Discrimination (Pre-post: $F = 29,56$; $df = \frac{1}{80}$; $p<0,01$), the Language Development and Verbal Fluency (Pre-post: $F = 101,27$; $df = \frac{1}{80}$; $p<0,01$) and the Conceptual Development subtests (Pre-post: $F = 153,71$; $df = \frac{1}{80}$; $p<0,01$). However, as can be seen from Figures 5 and 6, group CH tended to decline in terms of its functioning on the Motor Integration and Physical Development and Tactile Discrimination subtests. There is no statistical evidence that the differential behaviour of group CH is significant on the Motor Integration and Physical Development Subtest. However, the three-way interaction obtained on the Tactile Discrimination subtest ($F = 12,44$; $df = \frac{1}{80}$; $p<0,01$) suggests that the differential behaviour of group CH on this subtest is significant.

In spite of the general tendency for all groups to improve in terms of their functioning between pre and post-test, there was evidence of differential rates of improvement between the experimental groups and the control groups on the Tactile Discrimination (Pre-post x Condition: $F = 18,58$; $df = \frac{1}{80}$; $p<0,01$), the Visual-motor Co-ordination (Pre-post x Condition: $F = 31,28$; $df = \frac{1}{80}$; $p<0,01$), the Visual Discrimination (Pre-post x Condition: $F = 12,08$; $df = \frac{1}{80}$; $p<0,01$) and the Language Development and Verbal Fluency subtests (Pre-post x Condition: $F = 17,62$; $df = \frac{1}{80}$; $p<0,01$). These effects are demonstrated in Figures 12, 13, 14 and 15. In view of the discrepant pre-test scores for the experimental and control groups on these subtests, analyses of covariance were performed upon the combined data of groups EH and EL, and those of groups CH and CL.

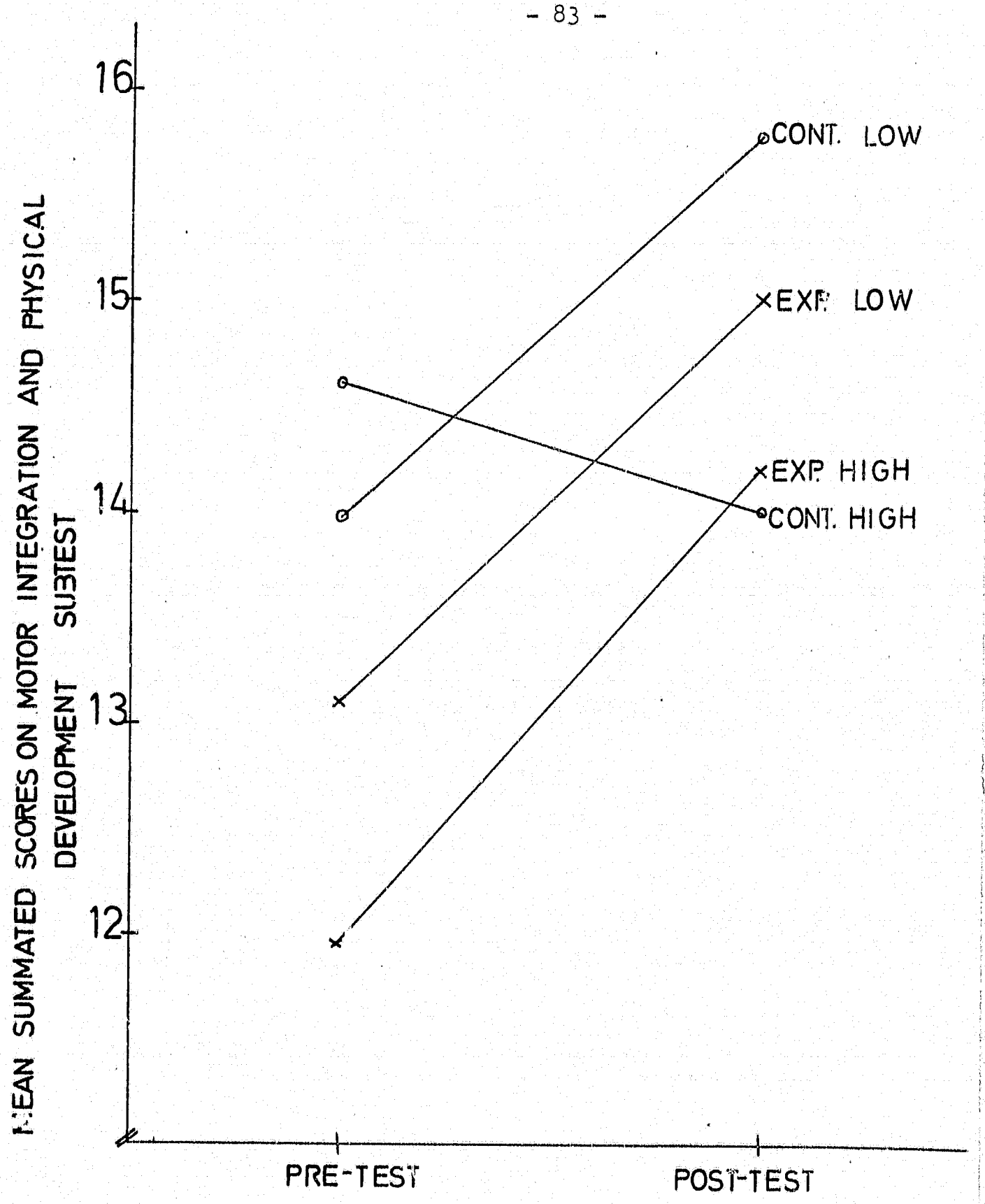


Fig 5. Comparison of the mean summated scores on the Motor Integration and Physical Development subtest of groups EH, EL, CH and CL on the pre- and post-test.

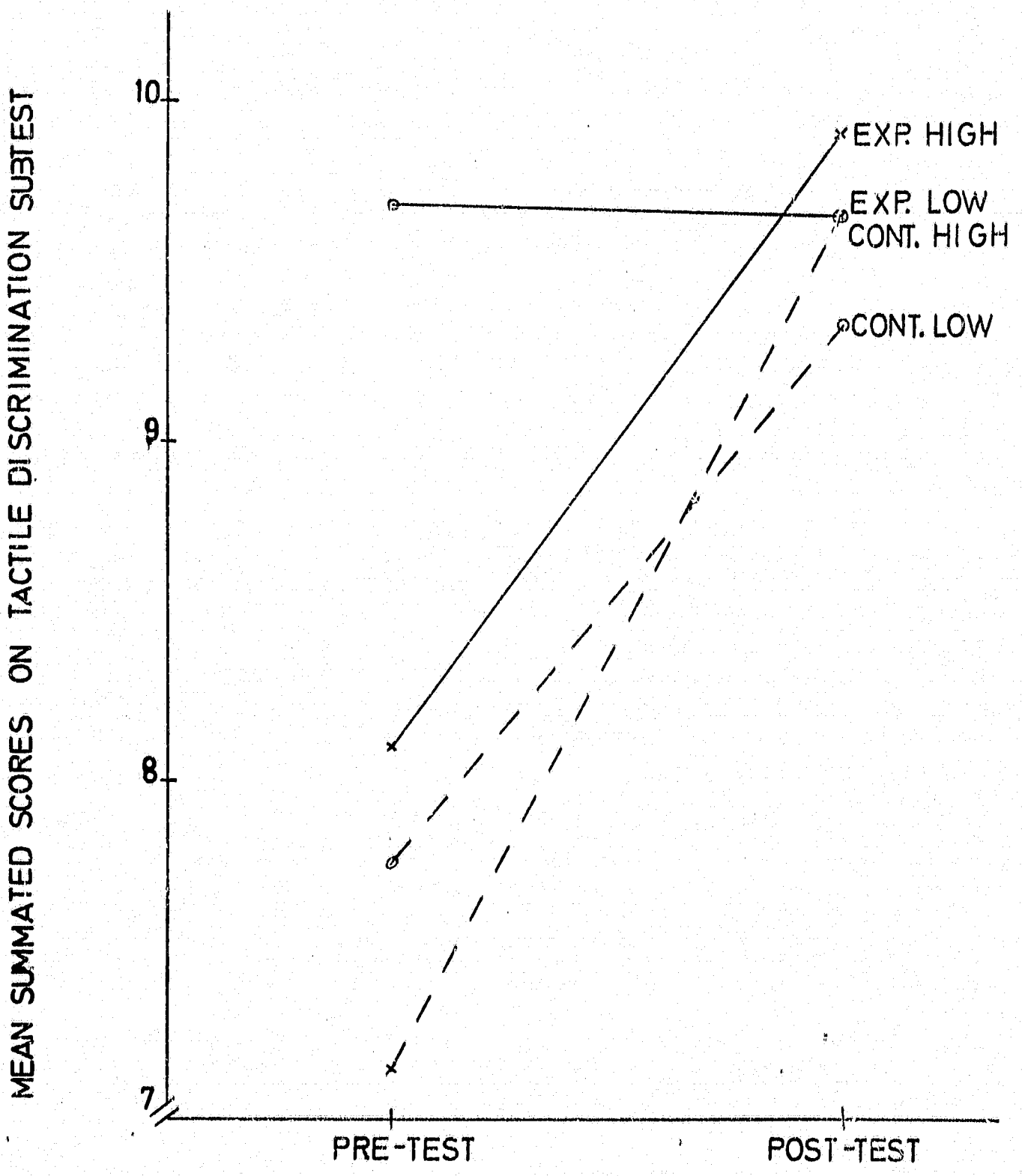


Fig 6. Comparison of the mean summated scores on the Tactile Discrimination subtest of groups EH, EL, CH and CL on the pre- and post-test.

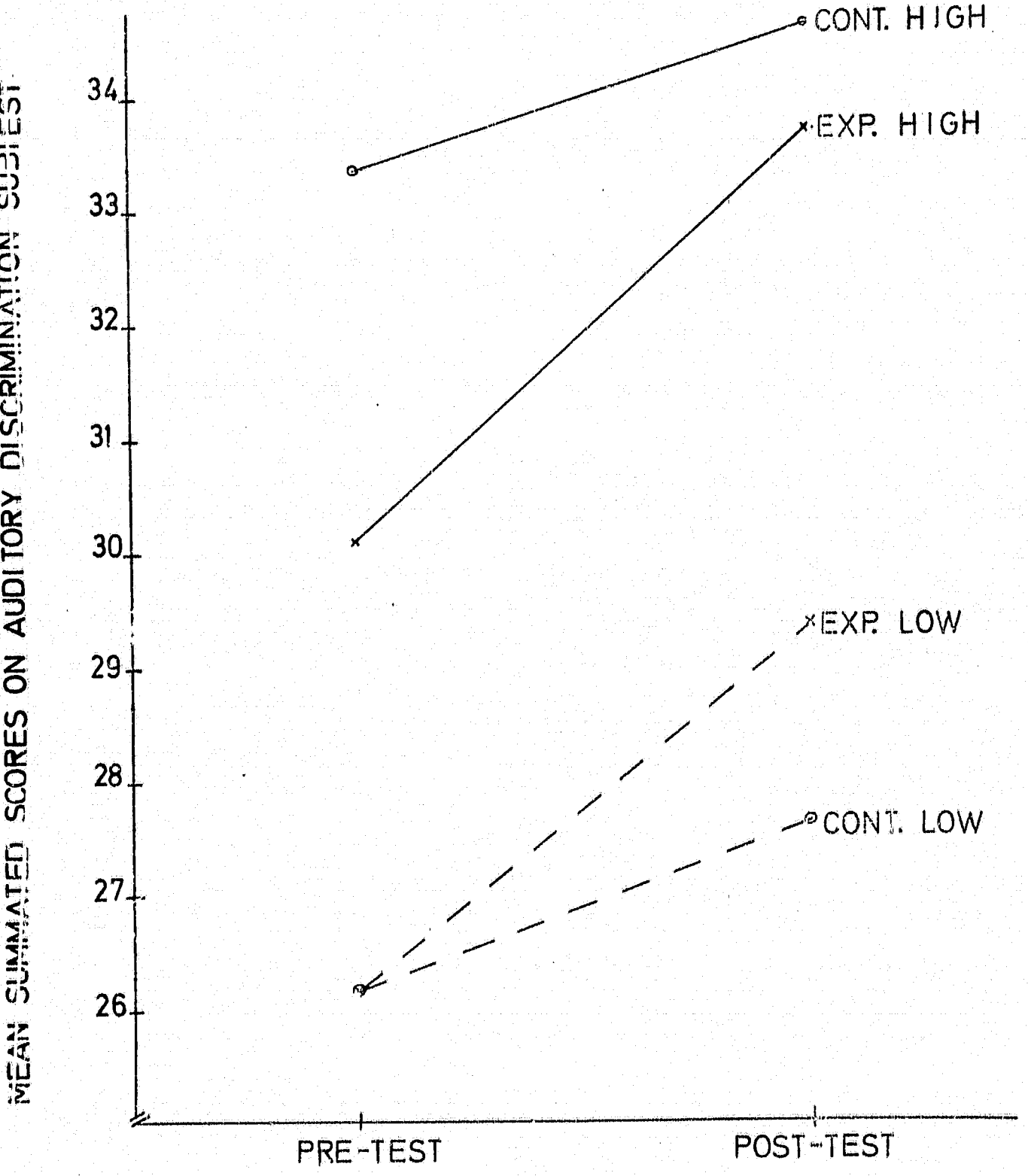


Fig 7. Comparison of the mean summated scores on the Auditory Discrimination subtest of groups EH, EL, CH and CL on the pre- and post-test.

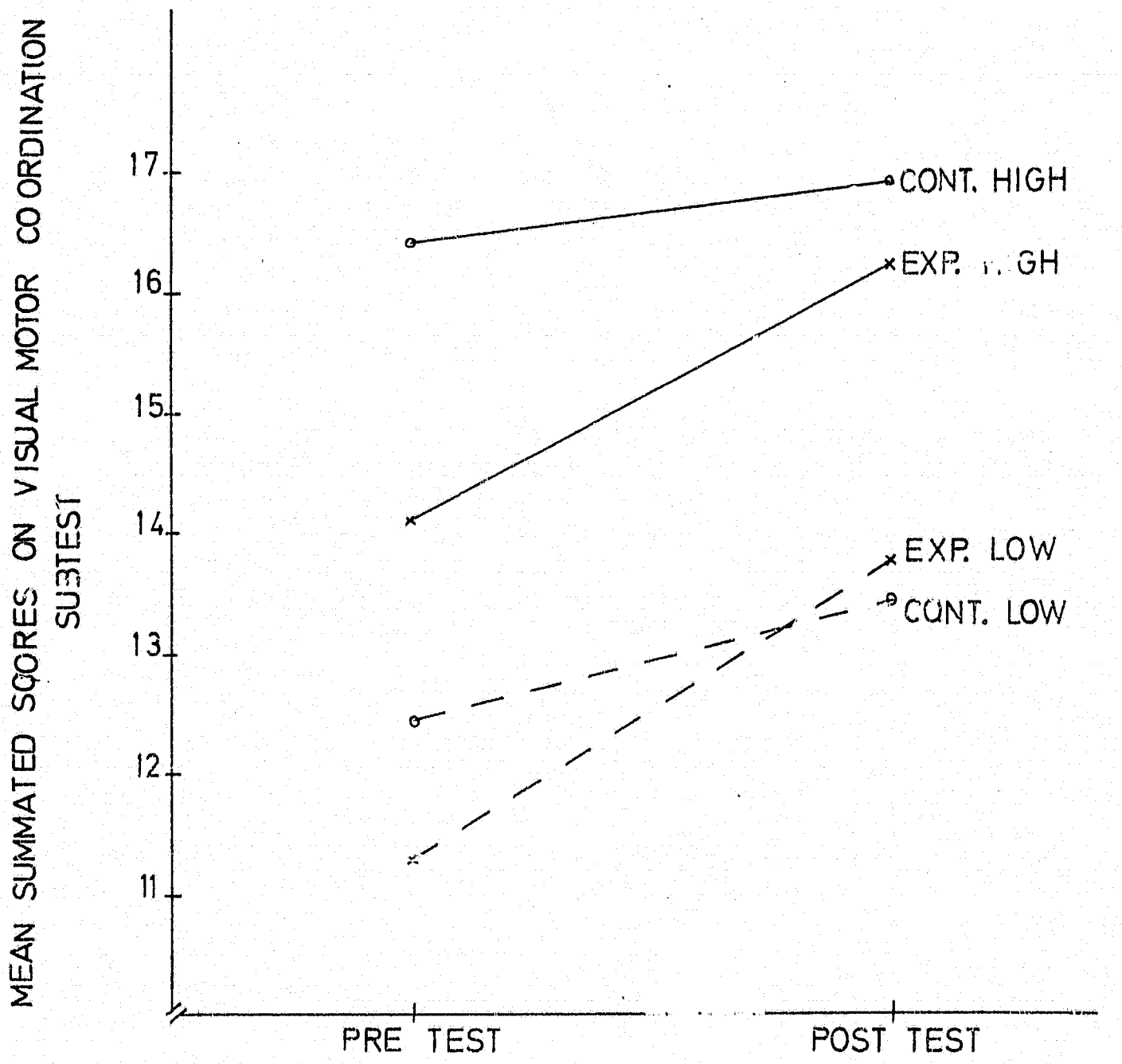


Fig 8. Comparison of the mean summated scores on the Visual Motor Co-ordination subtest of groups EH, EL, CH and CL on the pre- and post-test.

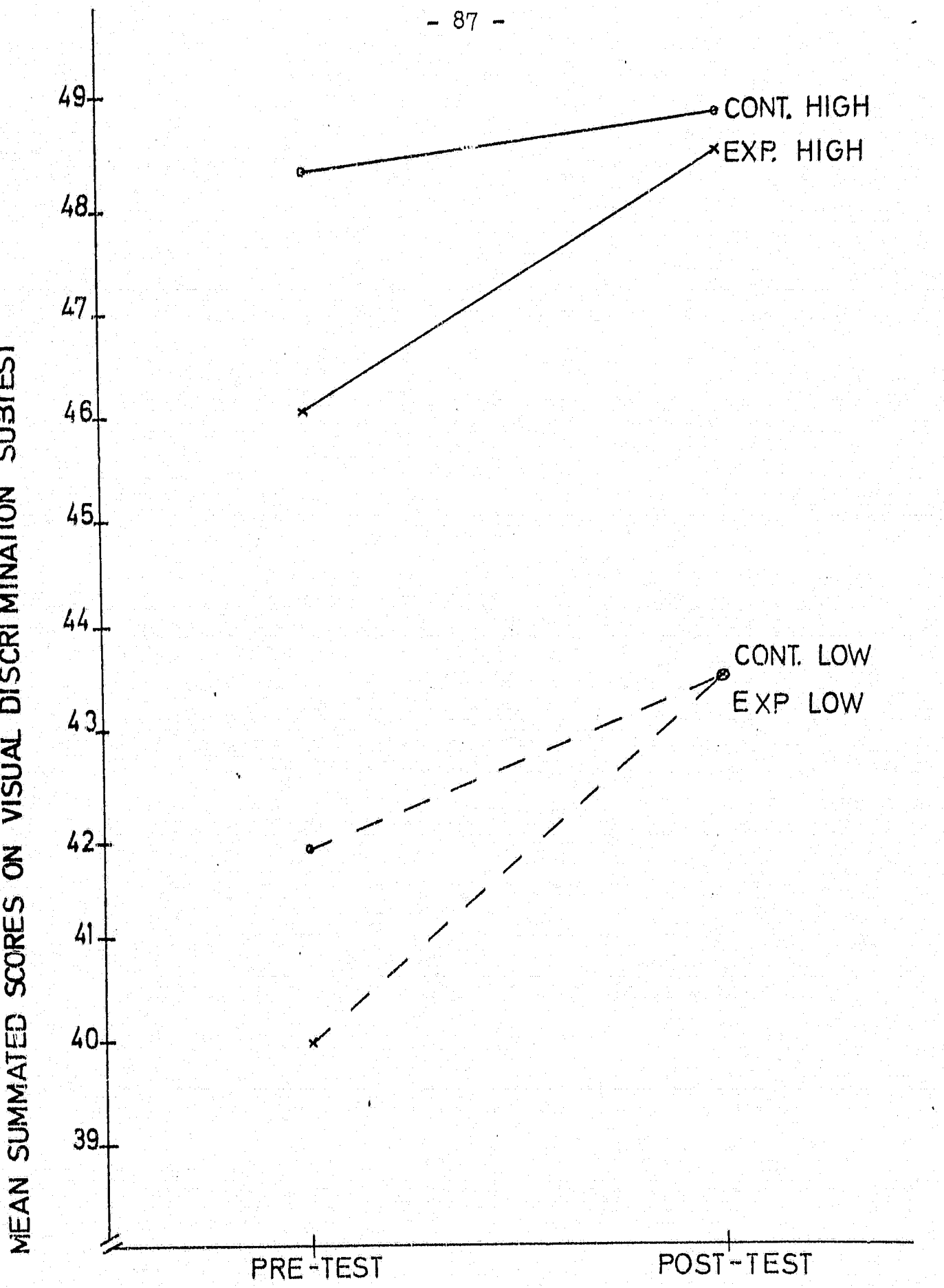


Fig 9. Comparison of the mean summated scores on the Visual Discrimination subtest of groups EH, EL, CH and CL on the pre- and post-test.

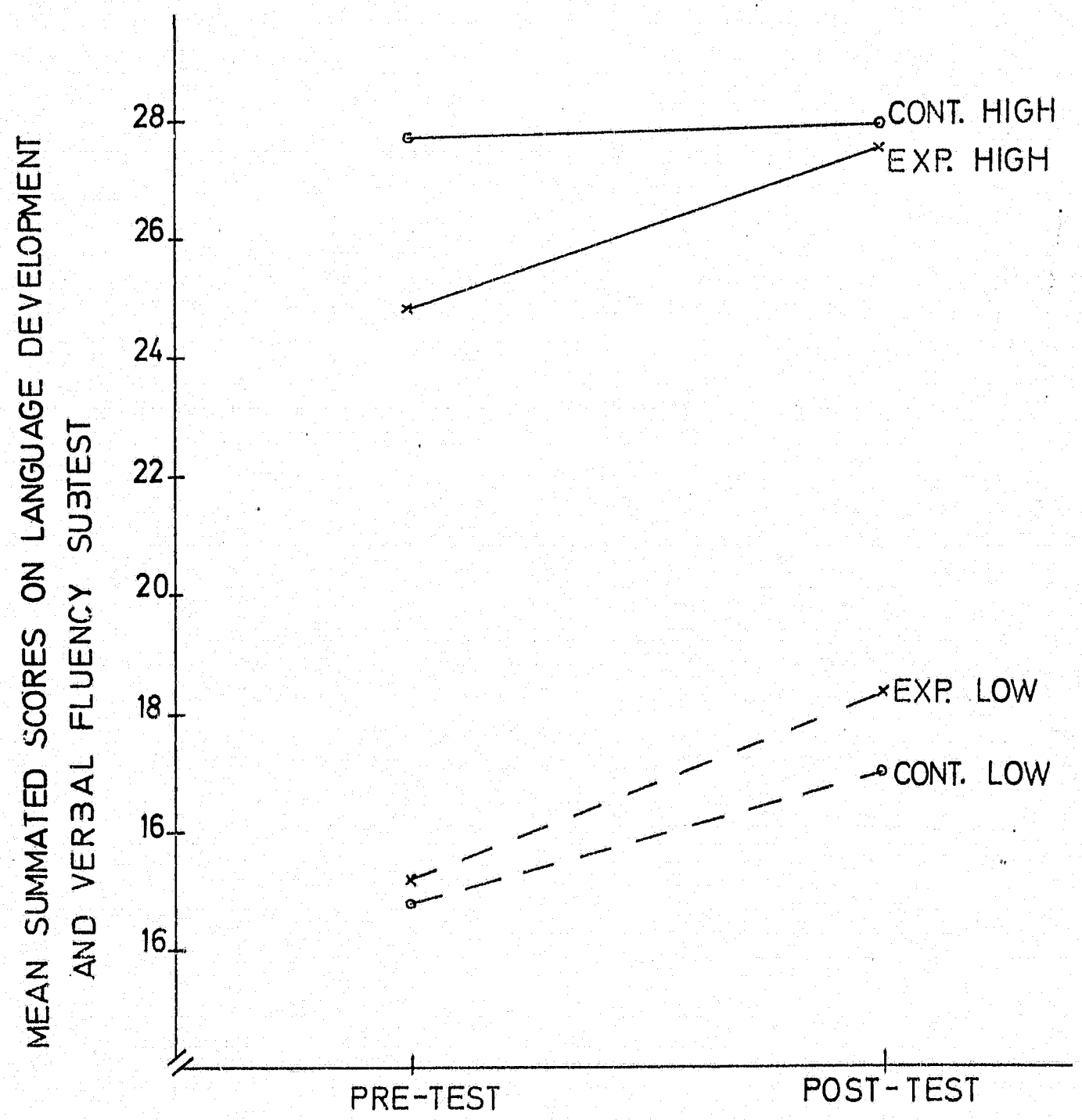


Fig 10. Comparison of the mean summated scores on the Language Development and Verbal Fluency subtest of groups EH, EL, CH and CL on the pre- and post-test.

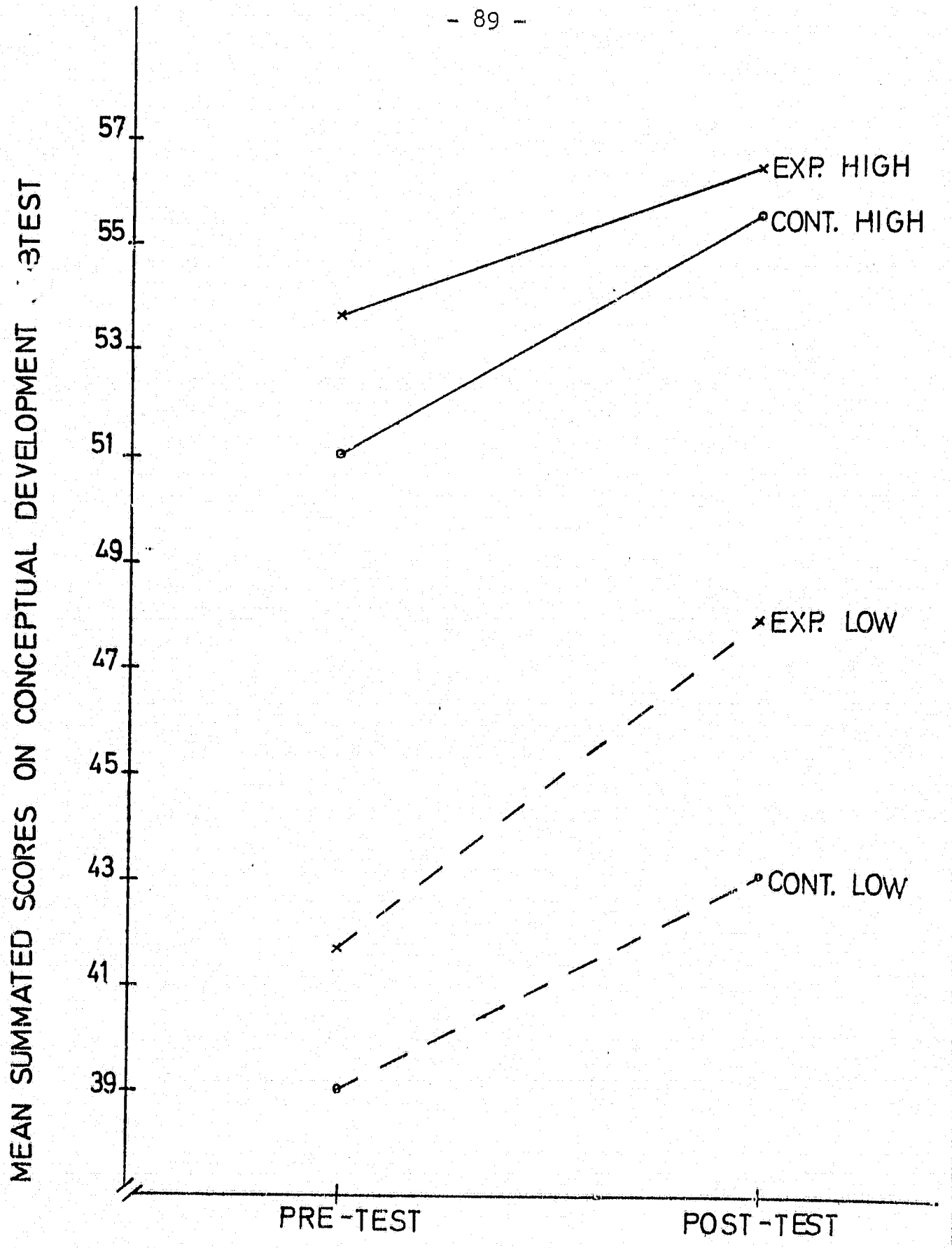


Fig 11. Comparison of the mean summated scores on the Conceptual Development subtest of groups EH, EL, CH and CL on the pre- and post-test.

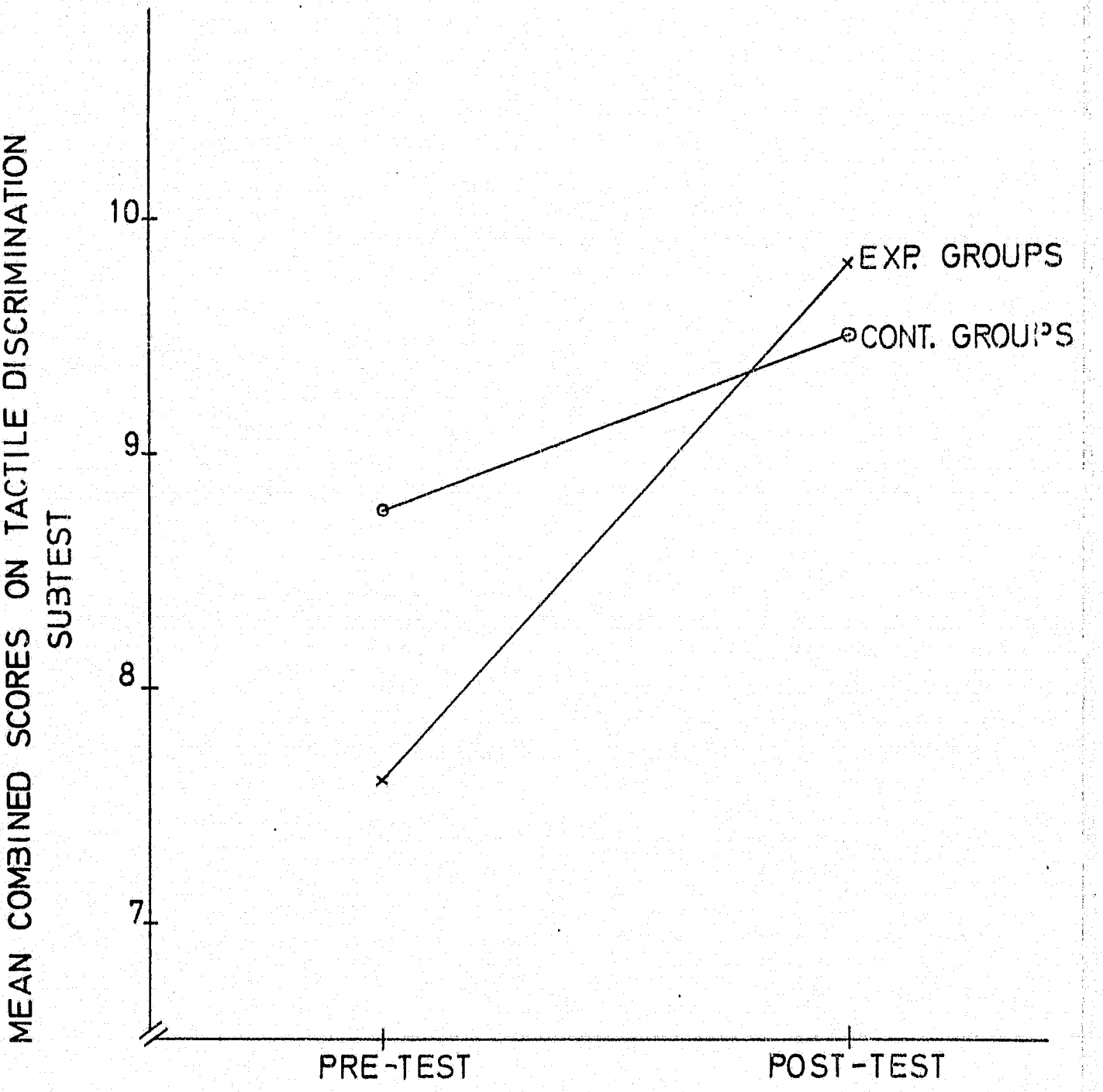


Fig 12. Comparison of the combined scores on the Tactile Discrimination subtest of groups EH and EL and those of groups CH and CL on the pre- and post-test.

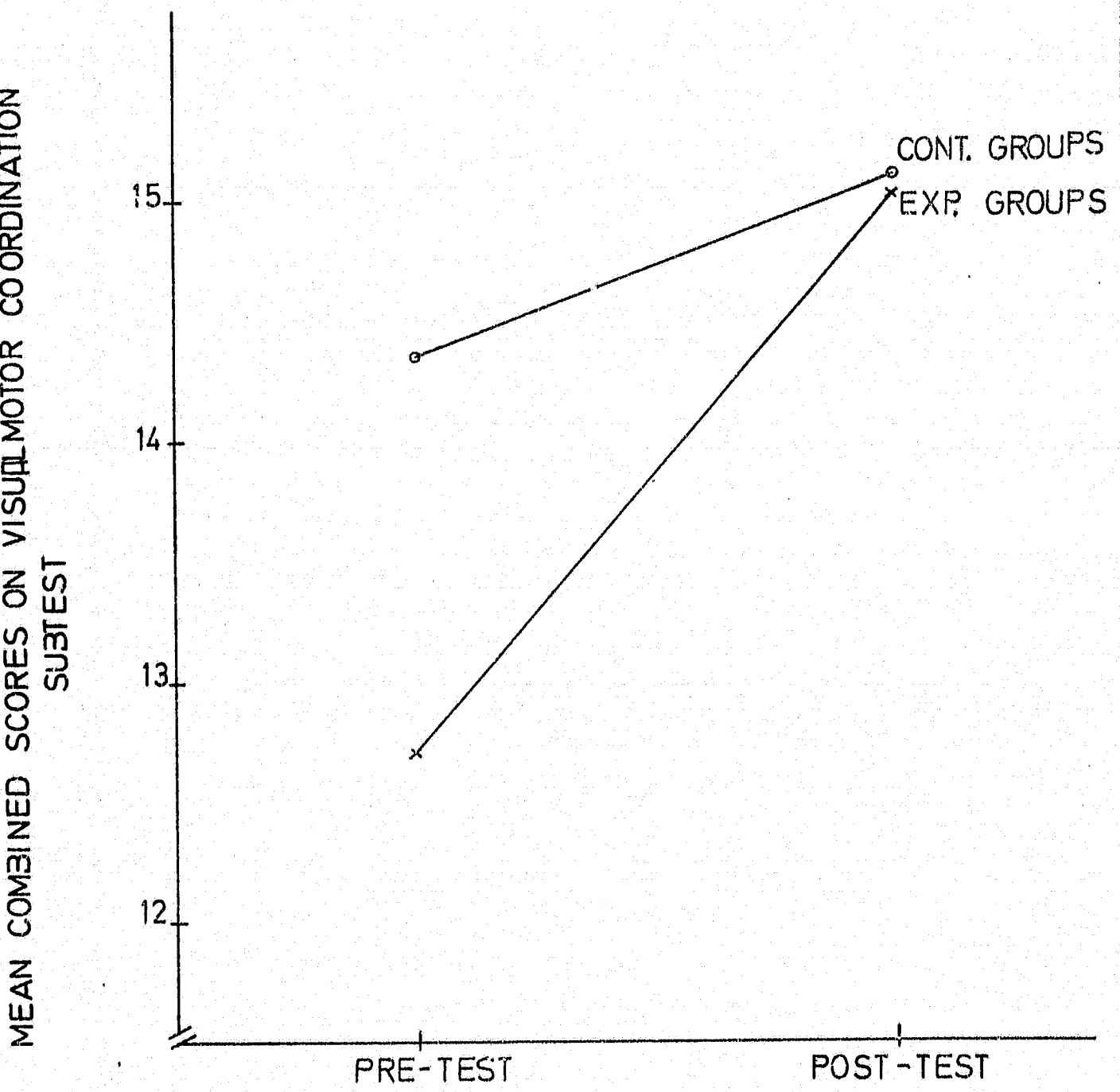


Fig 13. Comparison of the combined scores on the Visual Motor Co-ordination subtest of groups EH and EL and those of groups CH and CL on the pre- and post-test.

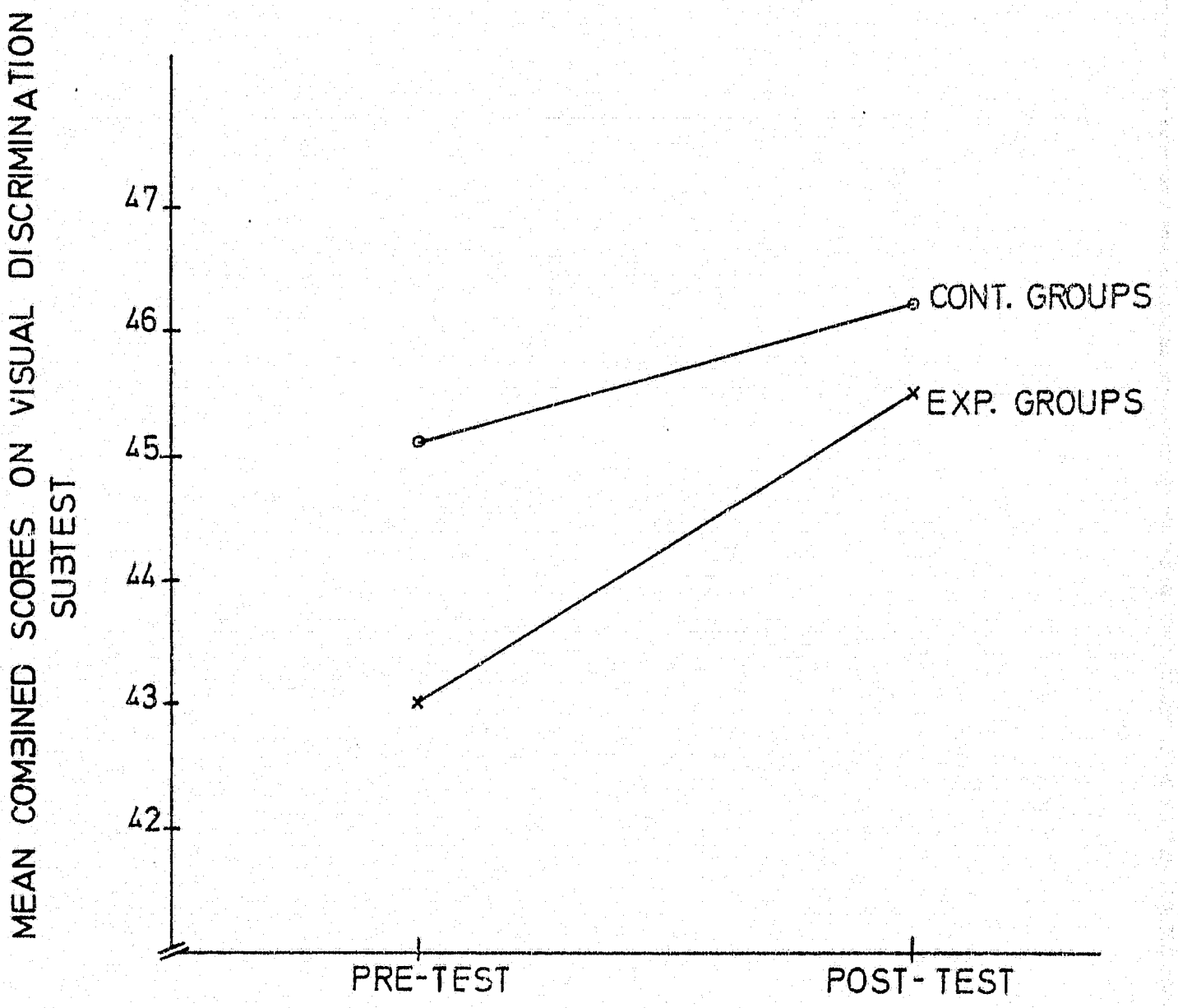


Fig 14. Comparison of the combined scores on the Visual Discrimination subtest of groups EH and EL and those of groups CH and CL on the pre- and post-test.

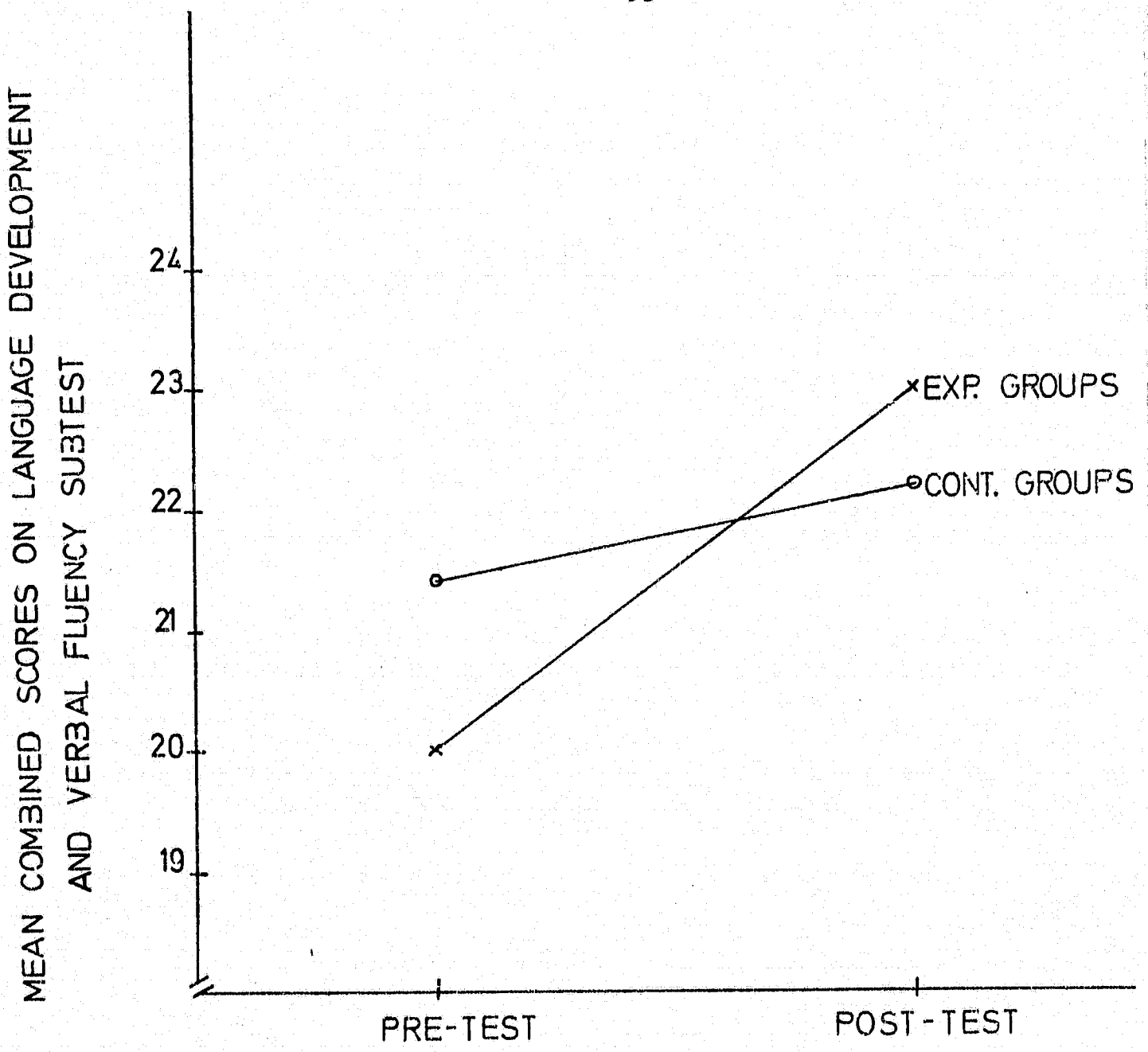


Fig 15. Comparison of the combined scores on the Language Development and Verbal Fluency subtest of groups EH and EL and those of groups CH and CL on the pre- and post-test.

The adjusted experimental group means were greater than the adjusted control-group means for the Tactile Discrimination, Visual-motor Co-ordination, Visual Discrimination and Language Development and Verbal Fluency subtests, although the difference between these adjusted means was significant only in the case of the Tactile Discrimination $F = 7,96$; $df = \frac{1}{39}$; $p<0,01$), Visual-motor Co-ordination ($F = 18,34$; $df = \frac{1}{39}$; $p<0,01$), and the Language Development and Verbal Fluency subtests ($F = 6,93$; $df = \frac{1}{39}$; $p<0,05$).

The high socio-economic groups exhibited superior pre- and post-test performance when compared with the low socio-economic groups on the Tactile Discrimination (Socio-economic: $F = 12,23$; $df = \frac{1}{80}$; $p<0,01$), the Auditory Discrimination (Socio-economic: $F = 94,27$; $df = \frac{1}{80}$; $p<0,01$) the Visual-motor Co-ordination (Socio-economic: $F = 26,63$; $df = \frac{1}{80}$; $p<0,01$), the Visual Discrimination (Socio-economic: $F = 29,56$; $df = \frac{1}{80}$; $p<0,01$), the Language Development and Verbal Fluency (Socio-economic: $F = 124,35$; $df = \frac{1}{80}$; $p<0,01$) and the Conceptual Development subtests (Socio-economic: $F = 32,36$; $df = \frac{1}{80}$; $p<0,01$). Significant Pre-post x Condition interactions were obtained on the Tactile Discrimination ($F = 9,84$; $df = \frac{1}{80}$; $p<0,01$), the Visual Discrimination subtest ($F = 4,41$; $df = \frac{1}{80}$; $p<0,05$) and the Language Development and Verbal Fluency subtests $F = 8,60$; $df = \frac{1}{80}$; $p<0,01$). Examination of Figures 6, 9 and 10 suggest that these interactions reflect a slightly increased rate of improvement on the part of the low socio-economic groups. In addition, there were two findings peculiar to the Auditory Discrimination and Conceptual Development subtests. Firstly, although there was no indication of differential rates of improvement with respect to the Auditory Discrimination subtest, a significant Socio-economic x Condition interaction was obtained ($F = 6,16$; $df = \frac{1}{80}$; $p<0,05$). A possible implication of this interaction is that group EH benefitted slightly less from the programme than did group EL when the performance of the corresponding controls is taken into account (Figure 7). In other words, the behaviour of the two experimental groups was reversed in relation to the corresponding control groups. Secondly, examination of Figure 11 reveals that with respect to the Conceptual Development subtest, there was a tendency for group CH to exhibit a slightly higher rate of improvement than its corresponding experimental group, whereas

there was a tendency for group EL to exhibit a slightly higher rate of improvement than its corresponding control group. This interpretation receives some support from the significant Pre-post x Socio-economic x Condition interaction ($F = 6,97$; $df = \frac{1}{80}$; $p < 0,01$).

5.2.5 Scores on the subtests of the Banham Maturity Level for School Entrance and Reading Readiness

As was true for the summated totals of the Banham Maturity Level for School Entrance and Reading Readiness, there was a general tendency for all groups to improve in terms of their functioning between the pre- and post-test both on the Reading Readiness (Pre-post: $F = 150,03$; $df = \frac{1}{80}$; $p < 0,01$) and on the Readiness for School Entrance subtests (Pre-post: $F = 143,60$; $df = \frac{1}{80}$; $p < 0,01$). These effects are demonstrated in Figures 17 and 16 respectively. Although a significant Pre-post x Condition interaction was obtained on the Readiness for School Entrance subtest ($F = 8,08$; $df = \frac{1}{80}$; $p < 0,01$), the apparent differential rate of improvement exhibited by the experimental and control group (Figure 16) was not confirred when pre-test values were held constant by means of an analysis of covariance performed upon the combined data of groups EH and EL, and those of groups CH and CL ($F = 1,74$; $df = \frac{1}{39}$). On the Reading Readiness subtest, the Pre-post x Condition interaction failed to reach significance ($F = 2,34$; $df = \frac{1}{80}$). However, exarination of Figure 17 suggests that groups CH and CL exhibited differential rates of improvement while no such differentiation existed between the experimental groups. This interpretation receives some support from the Pre-post x Socio-economic x Condition interaction ($F = 4,43$; $df = \frac{1}{80}$; $p < 0,05$).

The low socio-economic groups exhibited inferior pre-test and post-test performance to the high socio-economic groups on both the Reading Readiness (Socio-economic: $F = 11,55$; $df = \frac{1}{80}$; $p < 0,01$) and the Readiness for School Entrance subtests (Socio-economic: $F = 26,84$; $df = \frac{1}{80}$; $p < 0,01$). In addition, the low socio-economic groups exhibited a slightly greater rate of improvement than did the high socio-economic groups ($F = 6,18$; $df = \frac{1}{80}$; $p < 0,05$).

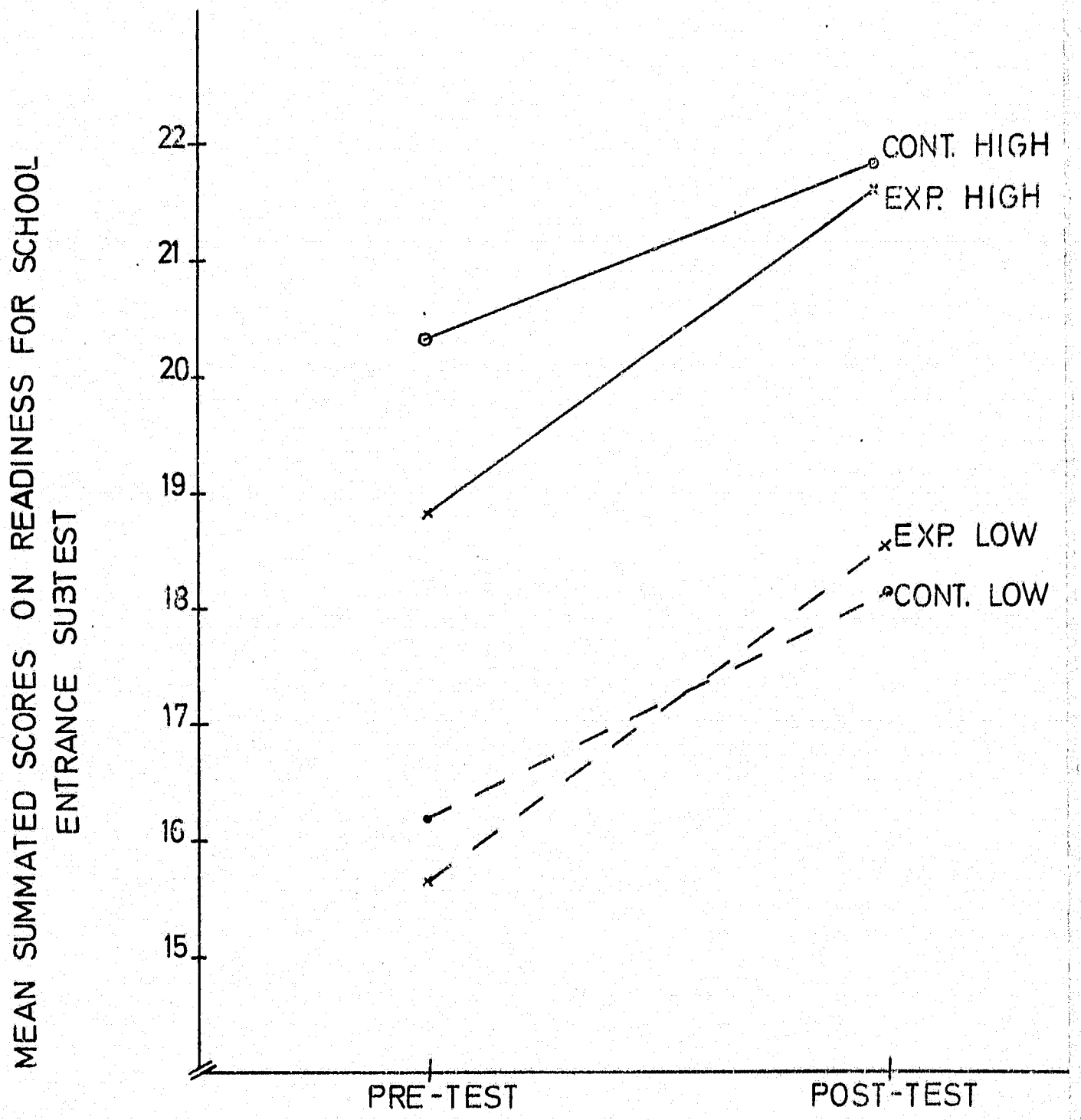


Fig 16. Comparison of the mean summated scores on the Readiness for School Entrance subtest of groups EH, EL, CH and CL on the pre- and post-test.

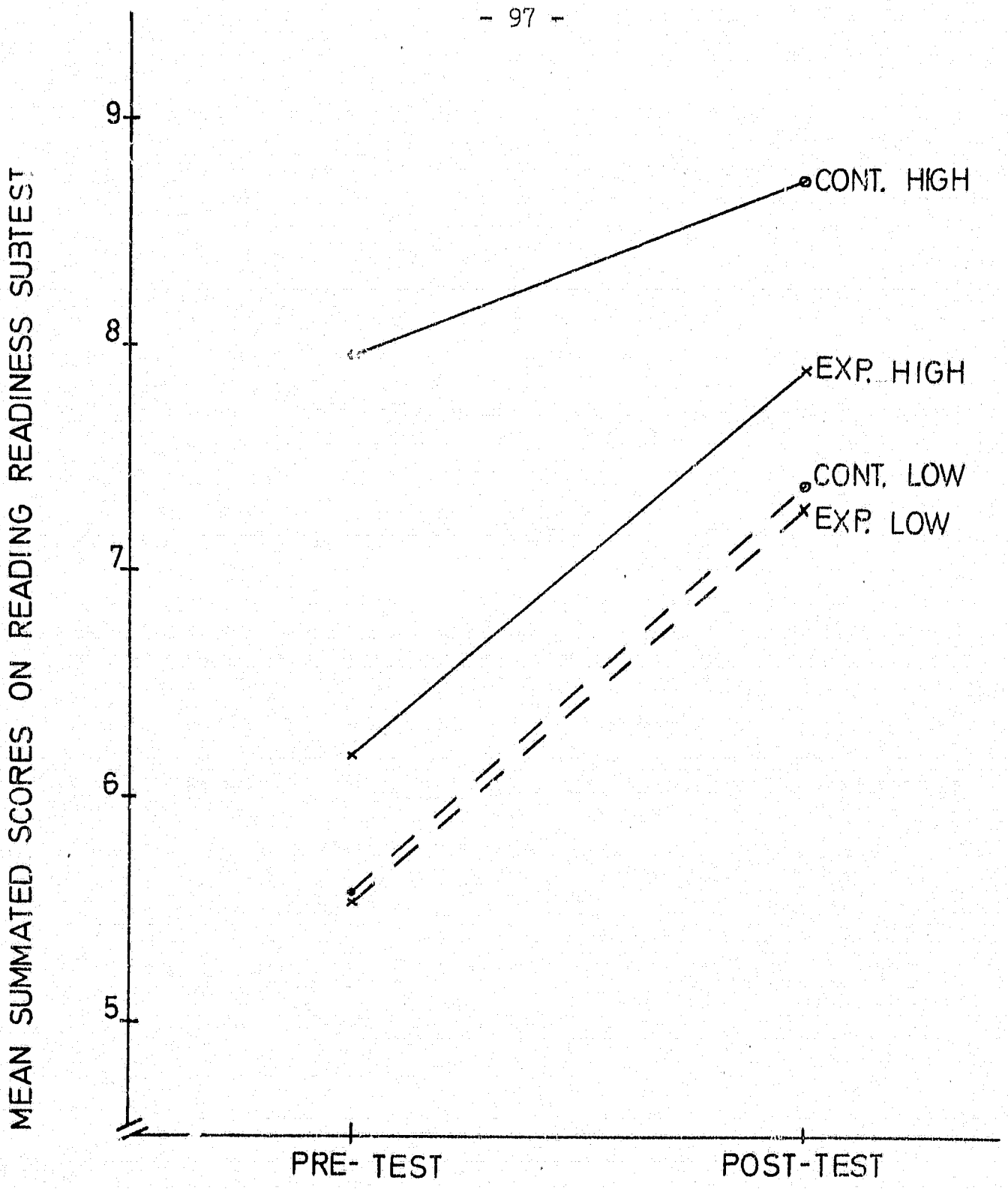


Fig 17. Comparison of the mean summated scores on the Reading Readiness subtest of groups EH, EL, CH and CL on the pre- and post-test.

CHAPTER 6

DISCUSSION

6.1 The first hypothesis

The first hypothesis, which stated that primary school children in the low and high socio-economic groupings will improve in terms of their functioning on the Valett Developmental Survey and the Banham Maturity Level for School Entrance and Reading Readiness as a function of the training programme, was supported. As would be expected, both experimental and control groups improved in the time period during which this study was effected. The functions tapped by the study improve naturally as a function of maturity and experience (Gesell, 1946; Haeuserman, 1958) and as a function of test exposure. The finding that the experimental groupsexhibited a greater improvement than the control groups on both measures suggests that the addition of the training programme to their Grade I - experience effected this greater improvement.

This finding is consonant with literature of the past three decades (Ball & Owens, 1968; Dawe, 1942; De Hirsch et al, 1966; Edgar et al, 1969; Elkind & Deblinger, 1969; Freyberg, 1966; Frostig, 1967; Hooper, 1967; Maloney et al, 1970; Peel, 1959; Saphier, 1973; Sigel et al, 1967; Sigel, 1969; Wepman, 1968), which has indicated that most of the functions measured here by the Valett Developmental Survey: motor integration, auditory discrimination, visual-motor co-ordination, visual discrimination, language development and verbal fluency and conceptual development can be improved by appropriate educative and remedial procedures.

When the subtests of the Valett Developmental Survey were considered in isolation, the majority supported the first hypothesis. Furthermore, on three of them: Tactile Discrimination, Visual-motor Co-ordination and Language Development and Verbal Fluency, the experimental and control groups exhibited significantly different rates of improvement, with the experimental group improving at a faster rate than the control group. This finding suggests either

that these three functions were particularly sensitive to the training programme, or that the nature of the programme favoured these three functions. With regard to tactile discrimination, there is a dearth of studies reported in the literature. Saphier, (1973) commented

> ... The most important aspect of kinesthetic awareness and the competencies that go with it, is probably in the area of the emotions - how a child feels about himself.
>
> (p. 586)

Saphier is here suggesting that there is a relationship between competence in the areaof bodily response to the environment and self-image; the more adequate and appropriate the former, the better the latter. If Saphier's suggestion proves to be correct, then it is possible that attention to tactile discrimination was associated with improved self-image. Improved self-image may, in turn, have affected overall achievement level for the experimental group children. However, no definite conclusion may be drawn from the present study.

The finding that the experimental grcup improved at a faster rate than the control group on the Visual-motor Co-ordination subtest may be viewed in the light of the work of Cruickshank (1961), Frostig & Horne (1964), Ismael & Gruber (1967) and Strauss & Kephart (1955). These workers emphasise the relationship between visuo-motor functions and academic success, stressing the importance of a firm visuo-motor foundation for later learning. On the basis of this finding, it might be hypothesised that the experimental group children, who had the benefit of visuo-motor training, would also show benefits in later learning.

When the total scores of the experimental group children were compared with the total scores of the control group children on the Banham Maturity Level for School Entrance and Reading Readiness, the results confirmed the first hypothesis. However, when the subtests were considered in isolation, neither supported the hypothesis.

As both subtests just failed to reach the required significance level, this failure to support the hypothesis is probably due to statistical error. An alternative explanation is possible. When experimental group children were compared with control group children, any differences in maturity level and reading readiness may have been masked due to the fact that both groups contained both high- and low socio-economic group children. When the socio-economic groups were differentiated out, however, a clear difference emerged between high- and low socio-economic groups with regard to maturity level and reading readiness (see discussion of the second hypothesis).

Before concluding that the scoring differences between the experimental and control groups are attributable to the training programme, a number of other factors must be considered. The children participating in the study were not matched on a one-to-one basis. However, the procedure of assigning one Grade I class to the experimental condition, and another class from the same school to the control condition for both the high- and the low- socio -economic schools, would tend to cancel out artifact due to differential IQ status, to differential nursery school attendance and to different numbers of immigrant children and repeat Grade I scholars. Furthermore, statistical provision was made for discrepant pre-test scores (see Data analysis). The teacher variable must also be taken into account. It proved impossible to match the teachers participating in the present study for age, marital status and number of teaching years. With regard to the age factor, Ryans (1960) investigated a sample of 213 elementary school teachers, and found that age did not appear to be significantly related to the attitudes of these teachers, although there was a tendency for teachers under thirty to be more liberal in their educational beliefs. With respect to marital status, he found that married teachers were significantly more friendly and understanding, more responsible and businesslike, more stimulating and had more favourable attitudes towards pupil - and child-centred views. Three of the four teachers participating in the research were married. The teacher in charge of the high socio-economic control group was unmarried. As regards number of teaching years, Ryans

(1960) found that among elementary school teachers, those with less experience tended to be more understanding and friendly towards pupils, more stimulating and more favourably inclined towards pupils and towards a child-centred approach.

As the teachers in the present study were unmatched as regards the just quoted variables, it was deemed important to subject them to other comparative measures. They were therefore compared on the variables hypothesised by Emlaw et al (1963) to be critical to teaching effectiveness: the Flexible-Rigid Dimension for Personal Cognitive Characteristics, and the Flexible-Rigid Dimension for Cognitive Attitude Toward the Pupil. The teachers did not differ significantly on these variables. Rossi (1961), after conducting a literature review, concluded that the contribution of the teacher to the student's achievements did not arise directly out of his background, training, sex or marital status - " the total educational experience affects the child, not just his teacher". (p. 270).

Having ruled out these artifactual variables as far as possible then, it seems reasonable to attribute the scoring differences between the experimental and control groups to the training programme.

6.2 The second hypothesis

The second hypothesis, which stated that primary school children in the low socio-economic grouping will exhibit poorer functioning on the Valett Developmental Survey and the Banham Maturity Level for School Entrance and Reading Readiness prior to and after the administration of the training programme, was likewise supported. The high socio-economic groups exhibited superior pre- and post-test scores on all the functions tapped by the Valett Developmental Survey bar motor integration and physical development. This subtest failed to discriminate between groups on both hypotheses. Motor integration and physical development are on the lower levels of Piaget's (1952) and Werner's (1961) hierarchy of intellectual development. It appears that all children participating in the present study had at least attained this level. When the children were divided into socio-

economic groups, they still exhibited no differences at this level. This finding corroborates the work of Deutsch (1963), who found that his disadvantaged subjects showed no difference in proficiency on motor tasks when compared with non-disadvantaged controls.

When the total scores for both socio-economic groups on the Valett Developmental Survey were considered, there was a suggestion of a greater rate of improvement by the low socio-economic group, although the post-test scores of this group were still lower than those of the high socio-economic group. This finding suggests that although the low socio-economic group appeared to improve at a slightly higher rate, their overall improvement was confined to the lower levels of the scale in question, and they failed to reachthe level of the high socio-economic group in the time period allotted to the study.

When the subtests of the Valett Developmental Survey were considered in isolation, the low socio-economic group exhibited an increased rate of improvement when compared with the high socio-economic group on the Tactile Discrimination, Visual Discrimination and Language Development and Verbal Fluency subtests. Visual Discrimination is an essential ingredient of Visual-motor Co-ordination (Frostig et al, 1961; Kephart, 1960). It was on the latter subtest, as well as on the Tactile Discrimination and Language Development and Verbal Fluency subtests that the experimental group exhibited a faster rate of improvement than the control group (see The first hypothesis). Because the low socio-economic groups exhibited an apparently greater rate of improvement than their corresponding high socio-economic groups with respect to these three functions, these functions appear to be particularly sensitive to general stimulation in the low socio-economic group. Denhoff (1973) found a correlation between low social class and visual-perceptual problems and secondary emotional problems. In the light of the present findings, and Saphier's (1973) suggestion that kinesthetic awareness is important for the affective domain, it appears that the low socio-economic children were not only most sensitive to general stimulation in the tactile, visual-perceptual and linguistic areas, but that there were affective gains

consequent on this stimulation. However, the present study utilised no formal measure of affectivity, nor is there any available research on the relationship between the functions measured here and affectivity. Consequently, no definite conclusion may be drawn as to the affective gains consequent on the stimulation provided by the training programme.

A number of studies confirm the relationship between low socio-economic status and retarded language development (Jensen, 1968; Whiteman & Deutsch, 1968). A study by Dave (1942) indicated that a speech and language training programme for orphanage children resulted not only in IQ gains of up to 14 points, but also in quite general transfer of training when experimental subjects were compared with matched controls. Like the children in Dave's study, the low socio-economic status children participating in the present study may be classed as "disadvantaged". Their pre-test scores on the Language Development and Verbal Fluency subtest were certainly inferior to those of their higher socio-economic status contemporaries (Figure 10), corroborating the findings of Whiteman & Deutsch (1968) that lowered socio-economic status is associated with lowered test scores on language functions. Many studies have revealed the importance for language development of the child's interactions with adults in cognitively and motivationally stimulating settings (Bloom, 1964; Milner, 1951; Whiteman et al, 1967) and how such interactions differ qualitatively and quantitatively when upper class parents are compared with lower class parents (Jensen, 1968; Schwebel, 1968; Whiteman & Deutsch, 1968). When Whiteman & Deutsch introduced interactional opportunities, they found an immediate effect on language functions. They conclude,

> ...to the degree that intervention attempts are capable of supplying compensatory experiences ... such attempts may be successful in reversing or ameliorating the cumulative deficit. (p. 113)

The intervention attempt represented by the training programme in the study may be adjudged to have supplied some measure of compensatory experiences for the lower-class children in the experimental group.

The relationship between low socio-economic status and perceptual styles and perceptual habits which are either inadequate or irrelevant to academic demands has been pointed up by Deutsch (1960) and Reissman (1962). Jensen (1968) concluded that many children viewed as retarded have merely failed to learn the verbal mediators which facilitate school learning. With regard to the affective gains, Hieronymus (1951) found higher socio-economic status was correlated with a high level of aspiration and positive attitudes towards school, while negative attitudes towards school and lower levels of aspiration were more frequently found among lower socio-economic groups. In the area of attitude toward the self and others, tendencies towards self depreciation and depressed self-concept have been noted by several observers to characterise children from the lower socio-economic groups (Dreger, 1960; Keller, 1963; Silverman, 1963). Golf (1954) found that lower class children have more feelings of inadequacy in school than do children from the middle class. These attitudes toward the self and others may affect not only aspiration and achievement, but maturity level as well.

When the subtests of the Banham Maturity Level for School Entrance and Reading Readiness were considered in isolation, they, like the total scores on this test, confirmed that the low socio-economic children started school with maturity levels below those of their contemporaries from the higher socio-economic group. Although the former exhibited a slightly greater rate of improvement than the latter on the two subtests, their post-test scores were still inferior. Thus the training programme appeared to result in gains in this area for the low socio-economic children, but the period of its duration was probably not long enough to allow the low socio-economic group to reach the level of the high socio-economic group. Whether the former would ever attain the level of the latter given an extended training programme cannot be answered on the basis of the present study. Eisenberg and Conner (1965) found considerable IQ gains after a 6-week preschool education programme. They caution however, that

> We are ... far from convinced that these gains will endure, given the overcrowding, educational impoverishment, and generally negative attitudes towards the poor... (p.118)

Deutsch (1965) believes that enrichment programmes should span a period of five years. Ideally, remedial programmes should last as long as their recipients require the aid they give. The present training programme extended over a period of ten weeks. There was ample evidence of gains on the part of the experimental group in general and the low socio-economic group in particular. However, whether or not these gains will endure is an open question, and one to be answered by further investigation.

The Reading Readiness subtest differentiated between the high- and the low socio-economic groups. This finding is in keeping with the work of Gray and Klaus (1965), and Milner (1951). The latter found that a composite score from a number of reading readiness tests showed a high correlation ($r = 0,86$) with social class index. Dividing children into high and low socio-economic groups on the basis of reading readiness scores resulted in the same two groups as resulted from a division made on the basis of social class. When certain middle class practices, like mother reading to her child for ten minutes a day (Irwin, 1962), or when pre-school programmes for deprived children were introduced (Gray & Klaus, 1965), performance on reading readiness tests improved when compared with the performance of controls. Furthermore, for those children who received ten minutes daily reading, measures of language development showed significant improvement. In the light of these findings, the increased rate of improvement for the low socio-economic groups on both the Language Development and Verbal Fluency and the Reading Readiness subtests is particularly relevant.

Thus, when the socio-economic variable is taken into account, the areaof MBD may be seen in a different light. Many disadvantaged children may show a marked lack of involvement with, attention to and concentration on the content of their academic experiences. They may exhibit immaturity as far as the demands of school are concerned.

They may appear to be slow to grasp and act upon verbal instruction. There may be few academic tasks which elicit their deep involvement. Their work habits may be poorly developed. Their sub-cultural norms may place a premium on non-academic pursuits. Consequently, they may be limited in their ability to inhibit responses to stimuli extraneous to academic learning. The end result of these factors may look like MBD, or a learning disability. This study, together with the literature on disadvantaged groups, suggests that what is classed as MBD in children of low socio-economic standing may not be MBD at all, but the result of disadvantaged circumstances, and that, given adequate compensatory experiences at the right point in the academic career and for the right length of time, the classification may become unnecessary for these children. Further research is indicated in order to tease out the ramifications of this suggestion.

A number of subsidiary findings are worthy of discussion. The high socio-economic children within the experimental group benefitted slightly less than the low socio-economic children within the same group from training in auditory discrimination. This finding supports the previous suggestion that children from disadvantaged environments are more sensitive to general enrichment procedures than children from already-stimulating environments. One of the factors conducive to faster rates of improvement in the low socio-economic group may be the novelty of the stimuli, leading to increased task interest, and therefore more rapid task mastery. For the high socio-economic group, many of the tasks may have lost their stimulus value through over-exposure (90% of this group had attended nursery school).

Finally, on the Conceptual Development subtest, the control subjects of high socio-economic standing actually exhibited a slightly higher rate of improvement than their counterparts in the experimental group. It might be argued that the children of high economic standing were developing conceptually in a normal manner i.e. that they were developmentally ready for conceptual tasks. The teacher in the control group may therefore have focussed on this area, while her counterpart in the experimental group allotted to this developmental area as much time as all the other developmental

areas because of the demands of the training programme. The high socio-economic children in the experimental group may, in fact, have been slightly delayed in their conceptual development by the structure of the training programme.

6.3 Conclusion

Although it has been argued that educational intervention should begin as early as possible because, by the first year of school, the child has already had several years in which to establish mechanisms that may interfere with school learning (Lawton, 1968), the present study has indicated that intervention at a Grade I level has benefits in a number of areas. These areas involve tactile discrimination, auditory discrimination, visual-motor co-ordination, visual discrimination, language development and verbal fluency and conceptual development. Although all children participating in the study improved in these areas, when the children of high socio-economic status were differentiated from children of low socio-economic status, a number of differences in the quantity and quality of improvement emerged:

1) Children of low socio-economic status began their formal academic careers behind their high socio-economic counterparts as far as tactile discrimination, auditory discrimination, visual-motor co-ordination, visual discrimination, language development and verbal fluency, conceptual development, maturity level and reading readiness were concerned.

2) Children of low socio-economic status appeared to be most sensitive to intervention (enrichment) at the tactile discrimination, visual-motor, language development and verbal fluency, social maturity and reading readiness levels, exhibiting increased rates of improvement when compared with children from the high socio-economic group.

3) After a ten-week period of intervention, the low socio-economic group still lagged behind their high socio-economic contemporaries in the following areas: tactile, auditory and visual discrimination, visual-motor co-ordination, language development

and verbal fluency, conceptual development, social maturity and reading readiness.

Thus although this intervention attempt was successful in supplying some compensatory experiences, a ten-week programme was insufficient to reverse the cumulative deficits of the disadvantaged children. Whether these deficits are reversible, and what time period is required, are questions which cannot be answered by the present study. Similarly, in order to ascertain whether these gains will endure, it would be necessary to embark upon a longitudinal study.

The findings suggested further, that there were emotional gains attendant on participation in the training programme, and that these emotional gains were most apparent in the areas of self-esteem, aspiration and achievement as far as the low socio-economic group was concerned. As far as socio-economic status and MBD are concerned, this study pointed up a need for more rigorous definition of the problem in order to exclude those children whose learning problems stem not from MLD, but from disadvantaged circumstances.

This study also supported Caplan's (1961) assertion that key figures in the community can act as effective remedial and preventive agents. Through the agency of the Grade I teachers, a programme of motor, perceptual, conceptual and social maturity assessment and training was put into effect. This programme served a dual purpose: it was remedial in that it filled social, cultural and academic gaps, and it was preventive in that it halted the accumulation of experiential deficit.

> Much remains to be done in the refinement of both diagnostic and remedial techniques, but it is not too soon to begin intensive work on prevention through appropriate educational experiences.
>
> (Bateman, 1973, p.30)

BIBLIOGRAPHY

Allen, J.W., & Whiteley, J.M. Dimensions of effective counselling: Cognitive flexibility and psychological openness in counselor selection. Charles E. Merrill, Ohio, 1968.

Anthony, E.J. A Psychodynamic Model of Minimal Brain Dysfunction. Ann. N.Y. Acad. Sc., 205, 52-60, Feb., 1973.

Atkinson, R.C., & Hansen, D.N. Computer-assisted instruction in initial reading: The Stanford Project. Reading Research Quarterly, 2, 5-26, 1966.

Ausubel, D.P. How reversible are the cognitive and motivational effects of cultural deprivation? Implications for teaching the culturally deprived child. Urban Education 1, 1, 16-38, 1963.

Ayres, J.A. Patterns of Perceptual-motor Dysfunction in Children: A Factor Analytic Study. Percept. Mot. Skills, Monograph Suppl., I-V20; 1965.

Ball, J.S. & Owens, E.P. Reading disability, perceptual continuity and phi thresholds. Perc. Motor Skills, 26, 483-89, 1968.

Barham, K.M. Maturity Level for School Entrance and Reading Readiness. Amer. Guidance Service, Minnesota, 1959.

Barnard, A. Minimal Brain Dysfunction. Diagnosis and treatment. Non-drug treatment. Early diagnosis, interpretation and intervention. A commentary on the nurse's role. Ann. N.Y. Acad. Sc. 205, 6-17, Feb. 1973.

Bateman, B. Three approaches to diagnosis and educational planning for children with learning disabilities. Acad. Therapy Quart., 2, 215-22, 1967.

Bateman, B.D. Educational implications of MBD. Ann. N.Y. Acad. Sci., 205, 20. 245-50, Feb., 1973.

Bayley, N. Comparisons of mental and motor test scores for ages 1-15 months by sex, birth order, race, geographical location and education of parents. Child Dev., 36, 379-411, 1965.

Behrens, J. "A study of psychological and electro-encephalographic changes in children with learning disorders." Unpublished doctoral dissertation, North-Western University, 1963.

Bender, L. Psychopathology of Children with Organic Brain Disorders. C.C. Thomas, Springfield, Illinois. 1956.

Benton, A.L., Behavioural Indices of Brain Injury in School Children. Child Dev., 33, 199-208, 1962.

_____ The Revised Visual Retention Test: Clinical and experimental applications. (3rd ed.) Psychological Corporation, N.Y., 1963.

_____ Right-left discrimination. Pediatric Clinics of North America, 15, 747-58, 1968.

_____ Minimal Brain Dysfunction from a Neuropsychological Point of View. Ann. N.Y. Acad. Sc., 205, 29-37, Feb., 1973.

Bereiter, C., Osborn, J., Engelmann S. & Reidford, P.A. "An academically-oriented preschool for culturally deprived children." Paper read at the American Education Research Association, Chicago, 1965.

Bernstein, B. Social class and linguistic development: A theory of social learning. In Halsey A.H., Floud, J. & Anderson C.A. (eds.), Education, economy and society. Free Press, N.Y., 1961.

Bijou, S.W., & Baer, D.M. Child Development. Vol I: A systematic and Empirical Theory. Appleton-Century-Croft, N.Y., 1961.

Birch, H.G., Brain Damage in Children - the biological and social aspects. Williams and Wilkens Co., Baltimore, 1964.

Birch, H.G. & Belmont, L. Auditory-visual integration in brain damaged and normal children. Developmental Medicine and Child Neurology, 7, 135-44, 1965.

Birch, H.G. & Lefford, A. Intersensory development in children. Monogr. of the Soc. Res. Child Dev., 28, 5, 1963.

Bloom, B. Stabilities and change in human characteristics. Wiley, N.Y., 1964.

Bond, G.L. & Tinker, M.A. Reading difficulties: Their diagnosis and correction (2nd ed.). Appleton-Century Grofts, N.Y., 1967.

Boshes, B., & Myklebust, H.A A neurological and behavioural study of children with learning disorders. Neurology, 14,1, 1964.

Bower, E.M. Primary Prevention in a School Setting. In G. Caplan (ed.) Prevention of Mental Disorders in Children: Initial Explorations. Tavistock Publications, London, 1961.

Brueckner, L.J. & Bond, G.L. The diagnosis and treatment of learning difficulties. Appleton-Century-Crofts, N.Y., 1955.

Bruner, J. The Cognitive Consequences of Early Sensory Deprivation. In P. Solomon (ed.) Sensory Deprivation. Harvard Univ. Press, Mass., 1961.

Campbell, S.B., Douglas, V.I. & Morgenstern, G. Cognitive styles in hyperactive children and the effect of methylphenidate. J. Child Psychol. Psychiat., 12, 55, 1971.

Caplan, G. An Approach to Community Mental Health. Tavistock Publications, London, 1961.

Capobianco, R. Qualitative and quantitative analysis of endogenous and exogenous boys on arithmetic achievement. In L.M. Dunn & R. Capobianco (eds). Studies in Reading and Arithmetic in Mentally Retarded Boys. Monogr. Soc. Res. Child Dev., 1,1, 1959.

Carter, H.L.J. & McGinnis, D.J. Diagnosis and treatment of the disabled reader. Macmillan, N.Y., 1970.

Chalfant, J.C. & Scheffelin, M.A. Central Processing Dysfunctions in Children: A Review of Research. NINDS Monogr. 9. US. Dept. Health, Educ. Welf., 1969.

Chaney, C.M. & Kephart, N.C. Motoric Aids to Perceptual Training. Chas. E. Merrill, Ohio, 1968.

Children's Learning Problems. The Star, June 15, 1972: Suppl. p. 1.

Chomsky, N. Language and Mind. Harcourt, Brace & World, N.Y., 1968.

Clark, G.M. A summary of the literature on brain damaged children. In C. Haywood (ed.) Brain Damage in School Children. Washington, 1960.

Clements, S.W. Minimal Brain Dysfunction in Children. NINDS Monogr. 3, Public Health Service Bulletin No. 1415, Washington, 1966.

Cohen, S.A. Minimal brain dysfunction and practical matters such as teaching kids to read. Ann. N.Y. Acad. Sc., 205, 212-222, 1973.

Conners, C.K. The Syndrome of Minimal Brain Dysfunction: psychological aspects. Pediat. Clin. N. Amer. 14, 749-766, 1967.

Cratty, B.J. Perceptual and Motor Development in Infants and Children. Collier-MacMillan, London, 1970.

Cruickshank, W.M., Bice, H.V. & Wallen, H.E. Perception in Cerebral Palsy: a study in figure background relationship. Syracuse Univ. Press, Syracuse, 1957.

Cruickshank, W.M., Bentzen, F.A., Ratzeburg, F.H. & Tannhauser, M.J. A Teaching Method for Brain-Injured and Hyperactive Children. Syracuse Univ. Press, Syracuse, 1961.

Dave, H.C. A study of the effect of an education program upon language development and related mental functions in young children. J. Experiment. Educ., 11, 200-209, 1942.

Davis, A. The future education of children from low socio-economic groups. In Elam, S. (ed.) New Dimensions for Educational Progress. Phi Delta Kappa, Ind., 1963.

de Hirsch, K. Specific dyslexia or strephosymbiolia. Jnl. Nerv. Ment. Disease, 120, 257-61, 1952.

_____ Two categories of learning difficulties adolescents. Amer. Jnl. Orthopsych., 33, 87-91, 1963.

_____ Early language development and MBD. Ann. N.Y. Acad. Sci., 205, 245-250, Feb., 1973.

_____ Jansky, J.J., & Langford, W. Predicting Reading Failure. Harper & Row, N.Y., 1966.

Delacato, C.H. Neurological organization and reading. Charles C. Thomas, Ill. 1966.

Denhoff, E., Laufer, M.W., & Holden, K.H. The syndromes of cerebral dysfunction. J. Okla. Med. Ass., 52, 6, 360-66, 1959.

_____ The natural life his ory of children with MBD. nn. N.Y. Acad. Sci., 205, 188-205, Feb., 1973.

Deutsch, M. Minority group and class status as related to social and personality factors in scholastic achievement. Society for Applied Anthropology, Monograph No. 2, N.Y., 1960.

_____ The Disadvantaged Child and the Learning Process. In H. Passow (ed.) Education in Depressed Areas. Bureau of Publications. Columbia University, 163-179, 1963.

_____ "Social intervention and the malleability of the child. Fourth Annual School of Education Lecture", Cornell University, 3 - 24, 1965.

_____ & Brown, B. Social influences in Negro-White intelligence differences. J. Soc. Issues, 20, 24-35, 1964.

_____ and Schumer, F. Brain-damaged children: A modality-oriented exploration of performance. Bruner/Mazel, N.Y., 1970.

Doll, E.A. Neurophrenia. Amer. J. Psych., 108, 50-53, 1951.

Doman, G., & Delacato, C. Train your baby to be a genius. McCall's, 65, 169, 170, 172, 1965.

Douglas, V.I., Weiss, G., & Minde, K. Learning disabilities in hyperactive children and the effect of methylphenidate. Can. J. Psychol. 10, 201, 1969.

Dreger, R.M. & Miller, K.S. Comparative psychological studies of Negroes and Whites in the United States. Psychological Bull., 57, 361-402, 1960.

Dykman, R.A., Peters, J.E. & Ackerman, P.J. Experimental approaches to the study of MBD. Ann. N.Y. Acad. Sci., 205, 93-108, 1973.

Dykstra, R. Auditory Discrimination Abilities and Beginning Reading Achievement. Reading Research Quarterly, 1, 1, 5-34, 1966.

Edgar, C.I., Ball, J.S. & MacIntyre, R.B. Effects of sensori-motor training on adaptive behaviour. J. Ment. Deficiency, 73, 713-20, 1969.

Edwards, A.L. Experimental Design in Psychological Research. Holt, Rinehart & Winston, N.Y., 1968.

Eisenberg, L. & Conner, C.K. The Effect of Head Start on Developmental Process. In G. Jervis (ed.) Kennedy Foundation Symposium on Mental Retardation. Chas. Thomas, Ill., 1965.

Elkind, D. & Deblinger, J. Perceptual training and reading achievement in disadvantaged children. Child Dev. 40, 11-19, 1969.

Ellson, D.G., Barber, J.L., Engle, L. & Kampwerth, L. Programmed tutoring: A teaching aid and a research tool. Reading Research Quarterly, 1, 77-127, 1965.

Emery, F.E. (ed.) Systems Thinking. Penguin Modern Management Readings, 1969.

Emlaw, R., Mosher, R.L., Sprinthall, N.A. & Whiteley, J.M. Teacher effectiveness: A method for prediction and evaluation. Nat. Elementary Princip., 43, 2, 1963.

Fernald, G. Remedial techniques in basic school subjects. McGraw-Hill, N.Y., 1943.

Fleishman, E.A., Thomas, P. & Munroe, P. The Dimensions of Physical Fitness. A Factor Analysis of Speed, Flexibility, Balance and Coordination Tests. Technical Report No. 3, The Office of Naval Research, Dept. Psychol , Yale Univ., 1961.

Flower, R.M. The Evaluation of Auditory Abilities in the Appraisal of Children with Reading Problems. In Perception and Reading, H.K. Smith (ed.) International Reading Association, Del., 1968.

Freyberg, P.S. Concept development in Piagetian terms in relation to school attainment. J. Educ. Psychol., 57, 3, 164-8, 1966.

Freedman, A.M. & Kaplan, H.J. Comprehensive Textbock of Psychiatry. Williams & Wilkins, Baltimore, 1967.

Frisk, M., Wegelins, B., Tenhunen, T., Widholm, O. & Hortling, H. The problem of dyslexia in teenage. Acta. Paediat. Scand., 56, 333-43, 1967.

Frostig, M. Testing as a basis for educational therapy. J. Spec. Educ., 2,1, 15-34, 1967.

_____ Lefever, D.W. & Whittlesey, J.R.B. A developmental test of visual perception for evaluating normal and neurologically handicapped children. Perc. Motor Skills, 12, 383-94, 1961.

_____ & Horne, D. The Marianne Frostig developmental test of visual perception. Consulting Psychology Press, Palo Alto, 1964.

_____ The Frostig program for the development of visual perception: Teacher's guide. Follett, Chicago, 1964.

Gaddes, W.H. A neuropsychological approach to learning disorders. J. Learn. Disabil., 1, 523-34, 1968.

Gagne, R.M. The Conditions of Learning. Holt, Rinehart & Winston, N.Y., 1970.

Gallagher, J.J. A comparison of brain injured and non brain injured mentally retarded children on several psychological variables. Monogr. Soc. Res. Child Develop., 22, 79, 1957.

_____ New educational treatment models for children with minimal brain dysfunction. Ann. N.Y. Acad. Sci., 205, 28, 383-9, Feb., 1973.

Gesell, A., & Amatruda, C.S. Developmental Diagnosis. Hamish Hamilton Medical Books, 1941.

_____ & Ilg, F. The Child from Five to Ten. Harper & Bros., N.Y., 1946.

Getman, G.N. The visuomotor complex in the acquisition of learning skills. In J. Hellmuth (ed.) Learning disorders, Vol. 1, Special Child Publications, Seattle, 1965.

Goldfarb, W. The effect of early institutional care on adolescent personality. J. Exp. Educ., 12, 106-129, 1943.

_____ Childhood schizophrenia. Harvard Univ. Press, Cambridge, 1961.

Goldstein, L.S. Evaluation of an enrichment programme for socially disadvantaged children. Institute for Developmental Studies, N.Y. University, 1965.

Golf, R.M. Some educational implications of the influence of rejection on aspiration levels of minority group children. J. Exper. Educ., 23, 179-183, 1954.

Gordon, E.W. Counselling socially disadvantaged children, J. Exp. Educ., 23, 179-183, 1964.

_____ Program of Compensatory Education. In Deutsch, M., Katz, I. & Jensen, A.K. (eds.), Social Class, Race and Psychological Development. Holt, Rinehart & Winston, N.Y., 1968.

Gray, S.W. & Klaus, R.A. An experimental preschool program for culturally deprived children. Child Dev., 36, 887-898, 1965.

Haeuserman, E. Developmental Potential of Preschool Children. Grune & Stratton, N.Y., 1958.

Hallahan, D.P., & Cruickshank, W.M. Psychoeducational Foundations of Learning Disabilities. Prentice-Hall, New Jersey, 1973.

Hammar, S.L. School underachievement in the adolescent: A review of 73 cases. Pediatrics. 40, 373-381, 1967.

Haring, N.G. & Hauck, M.A. Improving learning conditions in the establishment of reading skills with disabled readers. Except. Child., 35, 341-52, 1969.

Haring, N.G., & Ridgway, R.W. Early identification of children with learning disabilities. In R.F. O'Neil & R. Weinberg (eds). Learning Disabilities and Reading Difficulties. MSS Educational Publishing Co., N.Y., 1969.

Healy, W. & Bronner, A.F. New Light on Delinquency and its Treatment. Yale University Press, New Haven, 1936.

Hertzig, M.E. & Birch, H. Neurological organization in psychiatrically disturbed adolescents. Arch. Gen. Psychiat., 19, 528-37, 1968.

Hewett, F.M. The Emotionally Disturbed Child in the Classroom. Allyn and Bacon, Mass., 1968.

_____ Conceptual Models for viewing MBD: Developmental psychology and behavioural modification. Ann. N.Y. Acad. Sci., 205, 38-45, Feb., 1973.

Hieronymus, A.N. Study of social class motivation: Relationships between anxiety for education and certain socio-economic and intellectual variables. J. Educ. Psychol., 42, 193-205, 1951.

Hillard, G.H. Informati[illegible]al background as a factor in reading readiness and reading progress. Elementary School J. 38, 255-263, 1957.

Holt, J. How Children Fail. Penguin, Middlesex, 1964.

Hooper, F.H. Piagetian research and education. In I.E. Sigel & F.H. Hooper (eds). Logical Thinking in Children. Research based on Piaget's Theory. Collier-MacMillan, London, 1963.

Hunt, J. McV. Environment, Development, and Scholastic Achievement. In Deutsch, M., Katz, I. & Jensen, A.K. (eds). Social Class, Race and Psychological Development. Holt, Kinehart & Winston, N.Y. 1968.

Hurlock, E.B. Child Development. McGraw Hill, N.Y., 1967.

Inhelder, B. Some aspects of Piaget's genetic approach to cognition. In Cognitive Development in Children. Five Monographs of the Society for Research in Child Development. Univ. Chicago Press, Chicago, 1962, 1963, 1964, 1965, 1970.

_____ Developmental theory and diagnostic procedures. In D.R. Green (ed) Measurement and Piaget. 1971.

Irwin, O.C. Infant speech: The effect of family occupational status and of age on sound frequency. J. Speech and Hearing Disorders, 13, 320-23, 1948.

Isaacs, S. Intellectual Growth in Young Children. Routledge and Kegan Paul, London, 1950.

Jensen, A.K. Social Class and Verbal Learning. In Deutsch, M., Katz, I. & Jensen, A.R. (eds), Social Class, Race, and Psychological Development. Holt, Kinehart, & Winston, N.Y., 1968.

Johnson, D., & Myklebust, H. Dyslexia in Childhood. In J. Hellmuth (ed.). Learning Disorders. Vol. 1. Special Child Publications, Seattle, 1965.

_____ Learning disabilities. Educational principles and practices. Grune & Stratton, N.Y., 1967.

Keller, S. The social world of the urban slum child: Some early findings. Amer. J. Orthopsychiat., 33, 823-831, 1963.

Kennedy, W.A., Van de Riet, V. & White, Jr., J.C. A normative sample of intelligence and achievement of Negro elementary school children in the southeastern United States. Monogs. Soc. Res. Child Dev., 28, 6, 1963.

Kephart, N.C. The Slow Learner in the Classroom. Chas. E. Merrill, Ohio, 1960.

_____ Learning Disability: An Educational Adventure. Kappa Delta Pi Press, Indiana, 1967.

_____ & Getman, G. The perceptual development of retarded children. McGraw Hill, N.Y., 1956.

Kirk, S.A. Educating Exceptional Children. Houghton Mifflin, Boston, 1962.

_____ The Diagnosis and Remediation of Psycholinguistic Disabilities. Univ. Illinois Press, Illinois, 1966.

_____ From Labels to Action. An Interdisciplinary Approach to Learning Disabilities of Children and Youth. Assoc. for Children with Learning Disabilities, Okla., 1967.

_____ McCarthy, J.J. & Kirk, W.D. Illinois test of psycholinguistic abilities, revised edition. Univ. Illinois Press, Illinois, 1968.

Koppitz, E.M. Psychological Evaluation of Children's Human Figure Drawings. Grune & Stratton, N.Y., 1968.

Kubie, L.S. The fundamental nature of the distinction between normality and neurosis. Psychoanalyt. Quart., 23, 167, 1957.

Laufer, M.W. Cerebral dysfunction and behaviour disorders in adolescents. Amer. J. Orthopsychiat., 32, 3, 501-5, 1962.

Lawton, D. Social Class, Language and Education, Routledge & Kegan Paul, London, 1968.

Lehtinen, L.E. Preliminary conclusions affecting education of the brain injured Child. In A.A. Strauss & N.C. Kephart (eds). Psychopathology and Education of the Brain Injured Child. Vol. II. Grune & Stratton, N.Y., 1955.

Lewin, K. A Dynamic Theory of Personality. McGraw-Hill, N.Y., 1935.

Lovitt, T.C. Assessment of children with learning disabilities. Except. Child., 34, 233-39, 1967.

Lovitt, J.C., Kunzelman, H.P., Nolen, P.A. & Hulten, W.J. The dimensions of classroom data. J. Learning Disabilities, 1, 710-21, 1968.

Luria, A.R. & Yudovich, F.L. Speech and the Development of Mental Processes in the Child. Staples, London, 1961.

MacFarlane, J.W., Allen, L. & Honzik, M.P. A Developmental Study of the Behavioural Problems of Normal Children between 21 months and 15 years. Univ. Calif. Press, Calif., 1954.

MacKenzie, H., Clarke, M., Wolf, R., Kothera, M. & Benson, C. Behaviour modification of children with learning disabilities using grades as tokens and allowances as backup reinforcers. Exceptional Child, 34, 745-52, 1968.

Maloney, M.F., Ball, J.S. & Edgar, C.I. Analysis of generalizability of sensori-motor training. Amer. J. Ment. Deficiency, 74, 458-69, 1970.

McArthur, C. Analyzing the Clinical Process. J. Counselling Psychol., 4, 203-6, 1954.

McCarthy, J.M. Minimal brain dysfunction. Diagnosis and treatment. Non-drug treatment. Education: The base of the triangle. Ann. N.Y. Acad. Sci., 205, 362-7, Feb., 1973.

Menkes, M. 25-year follow-up study on the hyperkinetic child with minimal brain dysfunction. Pediatrics, 39, 393-99, 1967.

Messing, E.S. Auditory Perception: What Is It? In J.I. Arena (ed.) Successful Programming: Many Points of View. Academic Therapy Publications, Calif., 1969.

Milner, E. A study of the relationship between reading readiness in grade one school children and patterns of parent-child interaction. Child Dev., 22, 95-112, 1951.

Monroe, M. Children who cannot read. Univ. Chicago Press, Chicago, 1932.

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