THE EFFECT OF THE DUSO GUIDANCE PROGRAM ON THE INTELLIGENCE AND SOCIAL BEHAVIOUR OF INSTITUTIONALISED MENTALLY RETARDED CHILDREN

by
Wendy Ann Bagg

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ABSTRACT

This study was designed to test the effects of the DUSO Guidance Program on institutionalised mentally retarded children. It was hypothesised that as a result of the social stimulation received from this enrichment program, the mental age (MA) and IQ of the children would increase and their social behaviour improve.

The background to this study was discussed and involved the examination of relevant concepts in the fields of mental retardation, institutionalisation, general intelligence, social learning theory, and enrichment programs.

The subjects, 18 in each of the experimental and control groups, were drawn from the special school at Alexandra Institution in Cape Town, and were matched for sex and social behaviour.

The Individual Scale of the National Bureau of Educational Research (OSAIS) and Goodenough Draw-a-Man (DAM) tests, as well as a devised Social Behaviour Rating Scale were administered to the experimental group (mean chronological age of 13y 1m, IQ and MA on OSAIS of 55.7 points and 6y 9m respectively) before and after a two month period of the DUSO Program. The control group (mean chronological age of 12y 10m, IQ and MA on OSAIS of 54.4 points and 6y 7m respectively) were similarly tested before and after a two month program of stimulating activities designed to give them an equal exposure to the experimenter. Two months after the cessation of the programs, the two groups were again tested in order to assess whether any previously observed improvements had been maintained.

It was found that there was a significant within-group

increase in the average mental age of the experimental group of 9.13 months on the OSAIS test and 8.70 months on the DAM test. On the Social Behaviour Rating Scale, significant between-group increases were observed on five of the seven sub-tests, these figures being supported by teachers' reports on markedly improved conduct of the children.

The results were discussed with reference to past findings in the literature, and some suggestions for improvement in the experimental design and future research made. The conclusion was drawn that enrichment programs such as DUSO can have definite beneficial effects on the intellectual and social behaviour of institutionalised mentally retarded children.

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1. INTRODUCTION

> Recently the flurry of activity in services, training and care has improved the plight of the retarded. However, few new and effective treatments, training and educational programs have emerged. Additional years of basic and applied research are needed.
>
> - Baroff, 1974.

Mental retardation is a performance deficit which is associated with impairment in adaptive behaviour. It is neither a disease nor necessarily a permanent immutable state. There are a great many reasons why a given individual may be functioning at a subnormal level on tasks such as intelligence tests. Some children may be culturally disadvantaged, some developmentally retarded, and some limited in their potential. Regardless of origin, all mentally subnormal children share a type of experience that has to do with their inability to meet the expectations of their social environment.

The disrupting effect of these mental retardates on the family setting is one of the primary reasons for their being placed in the care of an institution. However, the effects of maternal and social deprivation or institutionalisation, on intellectual development are well documented (Bowlby, 1965; Pringle, 1965; Zigler et al, 1970). Consequently, the chances of the institutionalised retardate developing to his full potential are very much reduced.

Many studies concerned with the development of intellectual abilities have demonstrated the positive effects of stimulating environments. Educators are becoming more aware of the need to provide programs facilitating social and emotional as well as intellectual development. Research conducted into such programs within the framework of social learning theories (Bandura, 1965b) provides substantial evidence that modelling variables play a highly influential role in the development of social response patterns.

A program of activities utilising modelling techniques and concerned with developing understanding of self and others is the DUSO program. Dinkmeyer, the author of this program, which focuses on social and emotional learnings, states that, "only as the child understands himself, his needs, his purposes and his goals, is he free to become involved and committed to the educational process" (Dinkmeyer, 1970).

Positive results have been found in studies of the effect of the DUSO program on self-concepts (Eldridge et al, 1972); on understanding and acceptance of self (Cleminshaw, 1973); and on development of social awareness (Finley, 1973). The DUSO program has been referred to as a "language development program", allowing the children to show how they feel and think on the role-playing sessions (Maurutto, 1972). In addition, it has been demonstrated to increase IQ of normal institutionalised girls (Bagg, 1973) - after administering the program daily for one month to the subjects whose average chronological age was 8 years, it was found that the average increase in IQ (tested on the WISC) was 21 points.

Motivation for the present study stemmed from these many encouraging results with the DUSO program on normal subjects, and the consequent desire to extend these findings to the realm of mentally retarded children.

It was hypothesised that as with normal institutionalised children, the social stimulation provided by the DUSO program would increase both social behaviour and IQ of institutionalised mentally retarded children.

In particular, that as a result of the DUSO program:

1. the mental age of the subjects would increase (as tested on the OSAIS* and Draw-a-Man tests)
2. the IQ of the subjects would increase (as tested on the OSAIS and Draw-a-Man tests)
3. the social behaviour of the subjects would increase (as tested on the devised Social Behaviour Rating Scale)

The feeling was that the results obtained, even if less striking than those already cited in the literature, would also provide some positive guidelines for future research into the development of enrichment programs for retarded children.

* Individual Scale of the National Bureau of Educational Research.

2. RELATED BACKGROUND

2.1 MENTAL RETARDATION

Although general intelligence is often equated with learning ability, knowledge and coping with new situations, formal definitions of mental retardation usually refer to the adaptive consequences of limitations in these areas. Most commonly, retardation is identified with impairment in the capacity for prudent self-management, that is, for assuming the level of independence, appropriate to one's chronological age (Benda, 1954; Doll, 1941; Tredgold, 1937). Since incapacity for prudent self-management may also be due to emotional factors, definitions of mental retardation always relate it to an associated intellectual deficiency.

The issues which surround mental retardation are perennially contemporaneous. They relate to the nature of intelligence, its hereditability and modifiability, and the implications of intellectual impairment for the person and for the society in which he lives. They relate to poverty, race and to our basic attitude toward our fellow human beings. We live during a period of extraordinary social change - traditional values and social systems are under question and traditional views about the care and management of retarded persons are being carefully reassessed (Baroff, 1974).

Robinson and Robinson (1965) have succinctly summarised some of the many difficulties in drawing up a definition of mental retardation. In the light of the history of controversy about the nature of intelligence, its organisation, its predictability and its susceptibility to change, it is not surpris-

ing that no single definition of mental subnormality has ever been satisfactory to all concerned. In recent years there has been increasing emphasis on the problems and education of children whose intellectual handicaps are relatively mild, and who may under prepitious circumstances achieve at least limited social independence. It is with this group that problems of definition are most important, since the intellectual handicaps of these children are not so great as to determine their level of adjustment in every sphere. With severely retarded children, most of whom have neurological impairments as well, it matters little whether mental retardation is considered in terms of capacity to learn, knowledge possessed, social adaptation or personal adjustment, since these children are severely retarded in all these areas. Like normal children, however, children with mild intellectual handicaps are quite varied in their skills and abilities. The need for clarification in thinking about intellectual handicaps is thus acute.

There has been relatively minor controversy about whether mental retardation, when it is considered as a more general concept, should be defined in theoretical or in applied, practical terms. The problems of mental retardation are very practical for every society and traditional definitions have, therefore, tended to emphasise practical criteria. In one way or another, most definitions have equated the concept in social adaptation with the ability of the individual to make his way alone in the world with normal persons. Of late, however, somewhat greater attention has been paid to the possibility of more closely aligning current practical defini-

tions and current theoretical concepts (Benoit, 1959).

There is legitimate controversy over which abilities should be included in a definition of mental retardation, just as there is with respect to intelligence in general - abilities which demonstrate a child's ability to deal with abstract concepts. Another legitimate controversy concerns the question of whether or not it is possible or necessary to evaluate intellectual factors independent of emotional factors. Some writers have insisted that the two areas are intertwined so inextricably that one is meaningless unless it is treated as an integral part of the other. Other writers have considered that it is both proper and necessary to treat the two as distinct.

There has been some disagreement which is connected with the decision as to whether a definition of mental retardation should refer to the potential ability (Jastak, 1949)or to the present functioning ability of an individual (Silverstein et al, 1963). Most psychologists have come to agree that estimates of potential rather than present ability are subject to serious error. There has developed a corresponding agreement that a useful definition of mental retardation must rest upon estimates of the present abilities of the child, at least as these abilities are manifest under optimal conditions. On the other hand, those who still define mental retardation as incurable tend to place greater emphasis on an estimation of the potential growth of the child.

Many clinicians working with retarded children became impatient with the intense controversy which long raged over the question whether intelligence was due

to nature (constitution) or nurture (environment). They argued that in their work it mattered little whether the handicapped child from a substandard home had inherited his defect or had suffered damage from his unwholesome environment. The damage had been done, and what these workers most wanted was a test which would shorten the lengthy diagnostic process and help them assess the child's present strengths and weaknesses in terms of everyday behaviour.

Finally, there has been much debate concerning intelligence tests. Although the IQ-classification approach has had very wide use in the U.S.A., it has been much criticised. Its critics have deplored the facts that intelligence test results are sometimes substantially affected by non-intellectual factors and that individual IQ's sometimes change markedly with time. They have also cited the frequent misuse of the IQ and the tendency to ignore other sorts of information about a child and to pay attention only to his test score.

Nevertheless, intelligence tests do have advantages (Robinson and Robinson, 1965). They offer simplicity, ease of communication and well-defined normative groups for comparison. Most important it should be recognised that intelligence tests have provided an index of intellectual development which communicates the greatest amount of information about the intellectual status of a child in the least amount of time. This scheme (obtaining a score from a standardised test of intelligence) has, therefore, been popular with workers who have preferred a single-dimension basis for defining mental retardation. Spitz (1963) agrees that despite its limitations, the IQ measurement has proved invaluable in research. The IQ has sufficient validity, and is the most objective and readily communicated measure of intelligent behaviour

on hand: it had better not be discarded until it is replaced by a better instrument.

Without getting too involved in the controversy of what mental retardation really is, some definition must be given which can be of use in current investigations. If an experiment is to be reproducible, not only the parameters of the experimental situation must be specified but also the universe from which the subjects are drawn. This psychological disorder has had various labels, including mental retardation, mental deficiency, amentia and feeblemindedness (see Huey, 1912; Binet and Simon, 1914). Each of these labels has reference to inadequate mental processes whose presence can only be inferred by observing a child's inadequate performance. When a child's observed performance falls short of some arbitrary standard, this inadequacy may have a host of reasons - only one of which might be a permanent defect in his mental processes.

While definitions of mental retardation are formulated in behavioural terms tied to self-management, the determination of retardation is typically based on performance on an intelligence test, usually the Stanford Binet or Wechsler Scales. Scales on these tests are given in terms of IQ with an IQ range representing retardation usually beginning at least two standard deviations (SD's) below the mean of the general population (the bottom 2% to 3% of the population). The upper limit of their range is IQ 69 (Terman and Merril, 1960; Wechsler, 1949). In 1959 the American Association of Mental Deficiency (AAMD) offered a definition of retardation which extended its range to within one SD of the mean (Heber, 1959), and under it persons with IQ's of 70 to 84

were potentially classifiable as "borderline retarded". In Baroff's (1974) view, the upward revision of the range of mental retardation to IQ 84 was unwarranted and in the most recent AAMD definition it has been deleted (Grossman, 1973).

There are at least two reasons why the earlier inclusion of the "borderline" category was unjustified. First, it brought under the rubric of mental retardation individuals whose adjustive problems tended to be limited to school achievement; these persons did not usually demonstrate the broader adaptive deficits traditionally associated with retardation. Secondly, it had the unnecessary and undesirable effect of multiplying five-fold the number of individuals who could be stigmatised with the label "mentally retarded".

The current working definition of mental retardation is the 1973 revision of the AAMD definition of 1959, and is essentially identical to the earlier version except for the deletion of the category of "borderline retardation". The definition itself and the meaning of its major terms are quoted below from the AAMD Manual (Grossman, 1973).

Definition: "Mental retardation refers to significant subaverage general intellectual functioning existing concurrently with deficits in adaptive behaviour, and manifested during the developmental period".

Meaning of major terms: "Mental retardation" denotes a level of behaviour performance without reference to etiology (causation). Thus it does not distinguish between retardation associated with psychosocial (environmental) or polygenic (genetic) influences, and

retardation associated with biological deficit. Mental retardation is descriptive of current behaviour and does not imply prognosis (prediction as to the future diagnostic status of the person). Prognosis is related more to such factors as associated conditions, motivations, treatment and training than to mental retardation itself.

"Intellectual functioning" may be assessed by one or more standardised tests (typically the Stanford-Binet or Wechsler Scales) - "significant subaverage" refers to performance which is two or more SD's from the mean or average of the tests. It is emphasised that despite current practice, a finding of low IQ is never sufficient to make the diagnosis of mental retardation (referring to the dual criteria of adaptive deficit as well as IQ score).

The upper age limit of "the developmental period" is placed at 18 years and serves to distinguish mental retardation from other disorders of human behaviour.

"Adaptive behaviour" is defined as the effectiveness or degree with which the individual meets the standards of personal independence and social responsibility expected of his age and cultural group. Since these expectations vary for different age groups, deficits in adaptive behaviour will vary at different ages (and within and between cultural groups).

Ross (1974) underscores that mental subnormality is a performance deficit and not a disease entity. He points out the distinction advanced by Masland, Sarason and Gladwin (1958) between the "mentally retarded" and "mentally defective". Those who acquire appropriate

skills more slowly than their peers and whose development is retarded, might appropriately be called "mentally retarded", while those who are incapable of acquiring these skills altogether might be categorised as "mentally defective". The term "defective" implies that there is some defect in the child, that he is of limited potential or capacity, and that no matter what one might try, he would be unable to acquire additional skills (Ross, 1974).

Clarizio and McCoy (1970) see the characteristics of the mentally deficient (defectives) as physiological or anatomical defects. Zigler (1966a, 1967) has listed other distinctive traits. These include a tendency to have a lower degree of measurable intellectual ability (IQ of less than 50) and a high frequency of other physical disabilities including sensory and motor defects. The mentally deficient are inclined to have poorer health, markedly less stamina, and to appear disjunctive. They have very limited intellectual potential which becomes even more reduced when observed over a long period of time. Poor motor co-ordination, speech problems and general frailty predispose the majority of them to a dependent status.

Ross (1974) points out that like all labels, these terms are inadequate and beg a great many questions. The term "retardation" merely states an observation: the child is less advanced than his peers. The term "defective", on the other hand, carries implications of a limited potential. Potential, representing a projection into the future, can never be known - it can only be guessed and given presently available tools, this guess is most hazardous.

Clarizio and McCoy (1970) see mental retardation (familial) as possibly constituting the lower end of a normal continuum of intellectual ability as represented by a distribution of IQ scores. Zigler (1966a) holds that the mentally retarded is the larger of the two groups of mentally handicapped. Generally speaking, the mentally retarded include those persons with an IQ from about 50 - 75, although there is some overlap in IQ of the two groups. Persons in the mentally retarded group, approximately 75% of all mentally subnormal persons, are very comparable to average persons from whom they differ mostly in degree. Their impairment shows itself most clearly in specific situations demanding a high degree of ability to deal with the abstract. They tend to have good physical health, fair motor co-ordination and in general attain an adequate degree of personal integration, even though they take longer to realise their potential. Although less persistent, less self-confident and more dependent, the expectation of eventual self-sufficiency and independent adjustment is justified for these "late bloomers". The mentally retarded, also referred to as the "familial" retarded, and by Sarason (1959) as the "garden variety" retarded, as a group make the most promising responses to rehabilitation programs.

Contemporary diagnostic systems have generally not tried to make distinctions in the form of different labels, but rather have divided the population in the below 70 IQ range according to degrees of retardation. Thus, both AAMD definitions 1959 and 1973 treat 4 levels of retardation below IQ 69 - mild (educable: 55 - 69); moderate (trainable: 40 - 54); severe (25 - 39) and profound (under 25).

Many researchers in the field of mental retardation have attempted to differentiate between brain-injured (organic) and non brain-injured (familial) retardates. Robinson and Robinson (1965) have noted that a number of investigators have focused their attention on the scores obtained by brain injured children on different parts of intelligence tests. They have assumed that regularities in the effects of brain damage would lead selectively to lower scores on some items. Achievement in arithmetic, for example, might be hampered by the difficulties which brain-injured children seem to have in formulating concepts. Strauss and Lehtinen (1947) suggested this particular hypothesis on the basis of case history material which they had gathered. Experimental evidence has not, however, supported this conclusion (Bensberg, 1953; Benton, Hutcheon and Seymour, 1951; Capobianco, 1954) and investigations of individual items and separate sub-scales have in general been unrewarding (Baroff, 1959; Fisher, 1960, 1961; Frazeur and Hoakley, 1947; Hoakley and Frazeur, 1945).

Many writers have thought scatter (intra-test variability) to be greater in brain-damaged children than in other children of the same mental age, but the research evidence is not consistent on this point. Studies comparing brain-injured with cultural-familial retardates have typically shown greater scatter on only some items. Moreover, tests which have produced greater scatter with one brain-injured group often have not done so with other such groups (Berko, 1955; Cassel and Danenhower, 1949; Satter, 1955). Positive results tend to appear often enough, however, to lead one to suspect that in some children greater scatter is the result of organic damage.

A large scale study that attempted to differentiate between brain injured and so called garden variety or non brain-injured children, was conducted by Birch, Belmont, Belmont and Taft (1967) who examined all educable mentally retarded children aged 8, 9 and 10, living in the city of Aberdeen, Scotland. Results show that it does not appear very productive to seek etiological differentiation between retarded children with the test pattern of the Wechsler Scale.

Attempts to group mental retardates either in terms of ability or in terms of etiology are misdirected and unproductive (Clausen, 1966). No currently available psychological test can differentiate among the traditional etiological groups, and new groups do not emerge from sophisticated statistical analyses. Not even the much used dichotomy of organic and familial held up in Clausen's study, leading him to conclude that: "It is possible that mild organic impairment is of similar nature to the functional impairment or incomplete development which occurs in the familial retardate. The consequences of this would be that the etiological distinction into familials and organics, at least of the milder cases, has limited significance, as it does not reflect behavioural differences".

An extensive battery of available tests thus fails to permit one to differentiate between retarded children in terms of presence or absence of brain injury. Even if such differentiation were readily accomplished, the knowledge thus gained would hardly aid in making plans for helping an individual child (Ross, 1974). It is a well established finding (Zigler, 1966a) that when retarded and normal children are matched on mental age, the retarded perform less well or differently than the normal on many learning and problem-solving

tests. When matching a 10 year old child who functions at MA 7 (IQ 70) with a 7 year old who also functions at MA 7 (IQ 100), one may have matched test performance expressed in a MA score; but one has not matched reinforcement history for, if nothing else, the retardate has lived three years longer. Moreover, these three years have been filled with failure experiences, as have all the other years of his life (Ross, 1974).

Spitz's view (1963) is shared by many researchers - that all mental retardates are brain damaged in one way or another. By brain damage is meant a deficit or defect in the structure and/or functioning of the organism's brain mechanisms which has resulted in a lowered IQ. If an infant is born with a genetically transmitted deficit or defect in either the structure or functioning of his central nervous system (e.g. an endogenous, familial child), he should be no less classifiable as brain damaged than an infant who becomes retarded when his neural mechanisms are injured by disease or trauma. That he is differently damaged is unquestionable. By the same reasoning, however, a birth-injured infant displaying subsequent retardation cannot be lumped in the same (exogenous) catagory as a child who is retarded owing to a disease contracted in infancy. The disease-injured child is surely as different from the birth-injured as either is from the familial. The sub-types of brain injury are almost infinite. Furthermore, it is a good guess that increasing numbers of retardates who are now classified as endogenous will, with improved diagnostic techniques, be diagnosed as exogenous. There have been many experimental demonstrations of exogenous retardates performing in a reliably different manner

from endogenous retardates. But there have been just as many instances where this has not been the case. When diagnostic techniques become fine enough, and when and if subjects with different types of damage perform in a consistently reliable and different manner, some such differentiation will be welcomed. In the meantime, if one seeks to differentiate types of retardates, it would seem that the most promising approach would be to search for consistent differences on behavioural tests no matter what the underlying pathology (Spitz, 1963).

The research evidence mentioned so far supports the contention that the classification of the retarded in terms of presumed etiologies is neither feasible, using present day psychological tools, nor necessary in terms of educational planning (Ross, 1974).

The cultural relativism of intellectual impairment has already been touched upon, but since it has been an issue of much concern, it deserves further mention. It has been pointed out that the distinction between the IQ score and adaptive behaviour has definite cultural dimensions (Baroff, 1974; Robinson and Robinson, 1965; and Ross, 1974). The arbitrary standard with which the child's performance is compared is inevitably a reflection of the expectations his society holds about what is appropriate performance for a child at his chronological age. In other words, if in comparison with other children his age, his performance is deemed deficient and he approaches the tasks in a manner considered appropriate for children at a younger developmental level, he is called "retarded". In less technical developmental societies, persons with intellectual inadequacies can still meet that culture's criteria for a grossly normal adjustment.

In a more culturally advanced culture, however, these same persons might be at a serious disadvantage.

Robinson and Robinson (1965) briefly look at some relevant factors in the culture. They feel that a great number of factors in the environment affect the prevalence of perceived mental retardation. Among the more striking examples are the attitudes of the community toward the retardation, and standards in the child's surroundings related to his age, race and geographic residence - also, the effect of membership in a particular socio-economic group and the relationship of the size of the family to intellectual development. As far as age is concerned, population surveys consistently show an increased incidence of those diagnosed as retarded during school years and particularly during adolescence, with a sharp drop in the late teens and into adulthood. Apparently, the intellectual requirements for school entrance and promotion bring to light handicaps which have been mild enough to pass unnoticed.

It is noted in the literature that the effects of social class status are most directly related to the etiology of the mildly retarded child of the cultural familial group. It has been repeatedly noted that mildly retarded children tend to come from lower-class backgrounds, while severely retarded children come from homes which more nearly resemble a cross-section of the general population (Bradway, 1935; Sabagh et al, 1959).

Regarding the incidence of mental retardation - it has been found that the number of subnormal persons will vary according to the diagnostic characteristics being followed and the method of identification. An

accounting of the mentally subnormal is made difficult by the lack of agreement among clinicians as to what constitutes mental subnormality. An incidence rate of 3% of the general population is frequently cited as designating the portion of the mentally subnormal (Clarizio and McCoy, 1970). This figure evolved from surveys made many years ago, and was probably based on estimates gained from experiences with the more severe cases and extreme degrees of social maladjustment. Nevertheless, various explanations including genetic ones, have been offered to substantiate this figure, which was cited as recently as 1965 in the U.S.A. Although a few specialists believe that 3% is too high an incidence figure, the majority believe the figure is too low.

Almost all studies dealing with abnormalities in children report a higher incidence in males than females. No doubt many factors are involved here, from hereditary factors which make it more likely for the male to manifest recessive characteristics carried by the chromosome which determines sex, to a social system which requires of males a stricter standard of economic self-sufficiency than of females. Whatever the causes, the incidence of the diagnosis of mental deficiency among males is considerably higher than among females (Wunsch, 1951).

Estimates of potential for children in the subnormal range of intelligence are extremely hazardous; unless they are continuously questioned, they are likely to lead to standardised training procedures that are deemed successful when they permit a child to function at the level of his predicted potential. In settings where preconceptions about limited potential are dis-

carded, as in the program described by Birnbrauer, Wolf, Kidder and Tague (1965), retarded children can achieve at levels previously thought "impossible".

It is a salutary development that terms like "trainable" and "educable" as well as some of the more rigid uses of other classifications in the field of mental subnormality are beginning to be discarded (Ross, 1974). In addition, approaches to the training of subnormal children that ignore the question of etiology and focus instead on the behavioural assets and deficits of the child and address these in a systematic fashion, have been singularly successful.

2.2 INSTITUTIONALISATION

In reviewing past literature which deals with the effects of institutionalisation on children, it seems that among those who accept the evidence that these effects are generally adverse, there is a controversy about whether the ill-effects are attributable to the absence of a mother-figure or to a deprivation arising from a low level of environmental stimulation in the institution setting.

This study tends to support the stand that environmental inadequacy is the primary factor leading to progressive intellectual retardation, and hence, merely an adjustment of environmental factors (administration of the DUSO program in this case), rather than re-unification of the child with the mother, will produce a progressive increase in intellectual development.

Whereas numerous studies have documented the impaired language, poor intelligence and disturbed behaviour which frequently occur in children who have been reared in institutions (Ainsworth, 1962; Bowlby, 1951; Ferguson, 1966; Goldfarb, 1947; Yarrow, 1961), this is found in children coming from only some institutions. Thus Gavrin and Sachs (1963; Clarke and Clarke, 1959, 1960) found an average gain of nearly 9 IQ points in children admitted to an institution for short-term care (a period of some months) and Skeels and Dye (1939) found a marked rise in IQ in children transferred from a poor over-crowded orphanage to an institution for the mentally subnormal where more personal care was possible. A decided improvement was observed in some retarded children after being admitted to a residential institution (Clarke and Clarke, 1954).

Gardner, Hawkes and Burchinal (1959) and Rheingold and Bayley (1959) found no emotional or cognitive deficits following institutional care. Banham (1950) also failed to find ill effects in the great majority of the hundreds of institutionalised children whom she observed.

These results stand in stark contrast to those of Dennis and Najarian (1957), Goldfarb (1943b, 1945), Pringle and Bossio (1958a, 1958b), Provence and Lipton (1962) and others, who reported gross intellectual impairment and slow verbal development in institutional children.

Lyle (1959) feels that long residence in the institution retards verbal intelligence much more than non-verbal intelligence and that there are some indications that verbal development is especially vulnerable to damage when children grow up in an institutional setting (Lyle, 1960; Sievers and Essa, 1961). Experimental studies have shown that change in institutional care can lead to improvement in cognitive (verbal) level (Tizard, 1964). But, as many changes were introduced, it is not possible to be sure which were responsible for the rise in intellectual level. The lack of adult-child interactions in institutions has been systematically assessed by Rheingold (1961); Provence and Lipton (1962) noted the inflexibility of institutional care; and David and Appell (1961) observed the lack of communication and responsiveness to the infant's needs. There is ample evidence that even in good institutions the maternal care provided differs in both quantity and quality from that experienced in a family setting (David and Appell, 1961; King, Raynes and Tizard, 1971; Rheingold, 1960;

Tizard and Tizard, 1972). The attitude toward multiple mothering is conflicting - some feel it could even be stimulating (Clarke and Clarke, 1960; Hunt, 1960; Lewis, 1954; O'Connor, 1968, Rheingold, 1961), while others as possibly disrupting (Woodward, 1960). More recently Tizard and his colleagues have done much to demonstrate the crucial features of institutional life and the ways in which various sorts of institutions differ from one another (King and Raynes, 1968; King, Raynes and Tizard, 1971; Tizard, 1969; Tizard and Tizard, 1972).

Despite severe methodological and other criticisms (Casler, 1961; O'Connor, 1956a, 1956b; Yarrow, 1961) the concept of "maternal deprivation" has gained very wide currency. It seems that many authors have at different times expressed views in favour of the adverse effects of maternal deprivation (Bowlby, 1951; Goldfarb, 1943a). But Yarrow (1965) and O'Connor (1956b) have drawn attention to the need for a more precise definition of "maternal deprivation" and for causation in attributing separation as a cause for maladjustment. Ainsworth (1962) in discussing confusion caused by the term "maternal deprivation" agrees that it does not follow that separation necessarily implies deprivation. The term "separation" is best used to refer to the physical loss of the mother-figure, but not necessarily of mothering. "Deprivation" refers to the loss of maternal care but not necessarily of the mother-figure (Howells, 1970; Yarrow, 1961).

Thus, deprivation of the right emotional care, and not physical separation, is the hazard to emotional nurturing of the child (Ainsworth, 1962; Bowlby,

1972; Casler, 1968; Goldfarb, 1955; Holman, 1953; Lewis, 1954).

Studies carried out in orphanages and institutions show very clearly the importance of adequate stimulation in maximising the development of intellectual potential. Findings on presumably average children and studies of children with known brain injuries or mongolism have found higher IQs for children reared at home rather than in institutions (Centerwall and Centerwall, 1960; Stedman and Eichorn, 1964); a decline in IQ upon institutionalisation (Shotwell and Shipe, 1964); and an increased rate of progress with additional tutoring (Gallagher, 1962). The implication of these studies for the management of mentally retarded children should at least be considered.

Hebb (1949); Kirk (1958); Spicker, Hodges and McCandless (1966); and Skeels (1966) are a few of a lengthy list of scientists who have presented data in support of the notion that the type of early environment with which a person is associated significantly influences the extent to which characteristics such as intelligence develop. Bloom (1964) believes that the preschool years are of inestimable value because they are the period of most rapid growth and development of physical, cognitive and emotional characteristics. He suggests that they can be more dramatically changed during the more rapid, than slower, periods of growth. Bloom estimates that the difference between living in a deprived versus abundant environment between birth and age 4 is 10 IQ points, between 4 and 8 years of age 6 IQ points, and between 8 and 17 years of age

4 IQ points. This amplifies the fact that as age increases an individual becomes less amenable to, and affected by, intervention; accordingly, Bloom believes that by age 8 at least 80% of mature intelligence has developed (in Smith, 1971).

The effects of experiential factors may be expected to depend on when they occur in the course of development. Greater importance of the early developmental period or of certain "critical" periods is suggested by research on animals (summarised by Haywood and Tapp, 1966). There are hints that timing of environmental encounters may be important for human cognitive development as well, although precise studies are lacking. Bloom (1964) has concluded that at least 50% of intellectual development takes place during the first 3 or 4 years of life. For example, Lee (1951) observed that children who moved to a richer environment at a young age improved their IQ scores more during a given time period than children making the move at a later age. Similarly, effects of institutionalisation have been reported to vary with age of the child at the time of placement in the institution (Goldfarb, 1945). In these studies, however, the duration of the environmental condition being studied has usually been compounded with the time of occurence, making interpretation difficult (Uzgiris, 1970).

The study of children whose early infancy was spent in an institutional setting provides data on the deletereous effects of the absence of frequent and consistent external stimulation of the child, what Ribble (1943) calls the lack of gratification of the infant's "stimulus hunger". Gesell (1943) has described how

by the very nature of the institutional setup, the infant is unable to receive attention and how in the course of the day, different people with different attitudes handle the child. As Gesell (1947) points out, the institutionalised infant may be "propped up", possibly at regular intervals and for predetermined periods, but not always at the psychological moments which are most favourable, nor with endless variations and surprises which naturally enter into the flexible living of a domestic circle.

In discussions regarding the effect of the environment on language development, it is customary to refer to the detrimental effect of institutional care, which is presumed to be mediated by inadequate verbal stimulation (Tizard et al, 1972). The nature and extent of language deficit among children of the disadvantaged is by now a well-known fact, increasingly documented and specified by ongoing research (Bernstein, 1960; Cohn, 1959; Deutch, 1967; Raph, 1965). Minuchin et al (1968) sets language and language deficit into the context of the child's more general psychological development. It has both a relationship aspect (development of human communication) and a cognitive aspect (conceptual development - development of symbolisation and thought). When language emerges and developes in an optimal way, it seems likely that the child has already had a history of rich preliminary experience. This includes exposure to verbal models and direct reinforcement of verbal behaviour, but it also includes experiences that are not in themselves verbal. Primary among these are experiences with people who set up pleasurable and satisfying interchange with the child. There is body contact, laughter and games, a reaction

to gestures and babbling, and an attentive response to the moods, wishes and needs that the child conveys non-verbally.

Much has been written about the adverse effects of very early institutionalisation on the personality of the child (Farrell, 1956; Slobody and Scanlon, 1959), the consensus being that the child who has had the advantage of family living will be better able to adjust to the institution. Goldfarb (1943b, 1944) compared children placed in foster homes to those placed in institutions at a very early age. He found that the institutionalised children received significantly lower test scores, showed immature speech development, and in general presented many more indication of maladjusted behaviour.

A number of studies have compared the development of mongoloid children who had been placed in foster homes or institutions and those who had lived in their own homes (Kugel and Regue, 1961; Stedman et al, 1962). Differences have been found consistently to favour the group kept at home. Retests of individuals living in institutions constitute another approach to this question. This method is limited by the fact that those making the most favourable changes are likely to leave the institution, while those whose physical and intellectual deterioration has been severe are more likely to be removed from the sample by death.

There are few studies available that have generally emphasised the severely retarded child who was institutionalised early in life. Most institutions

for the retarded do not accept children who are under the age of 5 or 6, unless they are severely handicapped, and even above the minimum age, younger admissions are more likely to be severely retarded (Patton and Weinstein, 1960; Sabagh and Windle, 1960).

There is an apparent tendency for retarded children to lose their sense of individuality when they become accustomed to an institution. They soon come to depend on conformity to routine, instead of independent action. Similar trends have been noted in hospitalised schizophrenic patients (Sommer and Osmond, 1960). Moreover, there is some evidence that the initial years of institutionalisation lead to progressively higher social deprivation and that the institutionalised children develop a progressively higher level of motivation for adult attention (Zigler and Williams, 1963).

Occasional studies which have investigated both normal and retarded children suggest that retarded children act somewhat differently to institutionalisation than do normal children. Knights (1963) for example administered tests of anxiety and defensiveness to non-retarded and retarded boys and girls living in institutions and at home. He found that non-retarded children who were living in institutions were more anxious than their counterparts at home, but that the same relationship did not hold for retarded children, most of whom were quite anxious and defensive wherever they were placed.

On the basis of work of Goldfarb (1943, 1944), Skeels and Dye (1939), Woodworth (1941), Spitz (1945, 1946) and others (Bakwin, 1942; Bender and Yarnell, 1941;

and Chapin, 1915), it may be concluded that the lack of satisfying physical contact, the absence or inconsistency of maternal stimulation, and the failure of the environment to reward the infant's responsiveness to people and objects have a pervasive and retarding effect on the mental and physical development. In such an environment the child's awareness of, interest in, and satisfaction from, people and objects acquire little drive or "need" strength, making the acquisition of intellectual and social skills, dependent as these are on interpersonal relationships, unrewarding and consequently unlikely to be acquired (Sarason, 1953).

2.3 GENERAL INTELLIGENCE

Intelligence has long been of central concern to those seeking to understand the behaviour of living organisms and especially the behaviour of man. It is in connection with intelligence and the tests which measure it that some of the most violent polemics in psychology and in all the behavioural sciences have raged. These polemics have concerned the nature of man's intellectual capacities, how they should be defined and measured, how mutable or immutable they are, and what the implication of the decisions on these issues should be for educating and improving the race.

Theorists have tended to emphasise that general intelligence is the capacity to learn; the totality of the knowledge which has been acquired; and the ability to adjust or to adapt to the total environment, particularly to new situations (Robinson and Robinson, 1965).

These categories obviously cannot be mutually exclusive. The points of view differ primarily in emphasis; indeed, several authors have at one time or another defined intelligence in each of these three ways. The ability to learn must underlie the acquisition of information and knowledge and both learning ability and knowledge assuredly provide the foundation for adjustment to new situations.

Definitions which emphasise each of the three are found in the literature. Thus, for example, Colvin (1921) argued "intelligence is equivalent to the capacity to learn". Similarly Woodrow (1921) maintained "intelligence ... is an acquiring capacity". Henmon (1921),

however, defined intelligence as "the capacity for knowledge and knowledge possessed" and argued that "untutored savage ... may have high intellectual capacity, but without knowledge we should not ordinarily call him an intelligent man". In the opinion of Binet and Simon (1916), intelligence is "the sum total of all those thought processes which consist in mental adaptation". Stern (1914) thought of intelligence as "a general mental adaptability to new problems and conditions of life". Pintner (1921) wrote "intelligence is the ability of the individual to adapt himself to relatively new situations in life".

According to Anastasi (1968), intelligence should be regarded as a descriptive rather than an explanatory concept. An IQ is an expression of an individual's ability level at a given point in time, in relation to his age norms. No intelligence test can indicate the reason for his performance.

Anastasi also points out that intelligence is not a single, unitary ability, but a composite of several functions. The term is commonly used to cover a combination of abilities required for survival and advancement within a particular culture. It follows that the specific abilities included in this composite as well as their various weights will vary with time and place. At different cultures and at different historical periods within the same culture, the qualifications for successful achievement will differ. The changing composition of intelligence can also be recognised within the life of the individual from infancy to adulthood.

Traditionally, individual testing has been associated

with the measurement of general intelligence, a concept which has been under consistent attack on the grounds that it is too limited. Much criticism has been statistical rather than psychological, in the sense that it has been chiefly linked with the concept of "general intelligence".

Lyman (1971) sums up the criticisms that standardised tests have been accused of: not measuring innate (i.e. inborn) intelligence; being unfair to certain racial and minority groups; not measuring creativity; labelling children derogatorarily; favouring the glib individual and penalising the thoughtful person; invading privacy; giving inconsistent results; and being grossly misinterpreted.

The interpretation of intelligence test scores is dependent, in the first instance, on the way in which the test is constructed (Berger, 1970). The nature of test construction is such that each operation determines the adequacy of the procedures which follow it. As with any sequence of interdependent operations, deficiencies in the early stages undermine the structure.

The view that intelligence is a capacity fixed once and for all by genetic inheritance has had wide currency. Although exceptions can easily be cited, for example, Dashiell (1937), most of the general textbooks written before World War II tended to present the view that the IQ is essentially constant because intelligence is fixed. According to this conception, growth in intelligence should be at a rather constant rate, so that IQ remains the same (within limits of error of the test) when the child is tested at, say, age 3 and age 9.

Without denying an important role to the genes in the development of intelligence, there is relatively new evidence concerning the role of experience in the development of intelligence. The genes set limits on the individual's potential for intellectual development, but they do not guarantee that this potential will be achieved and they do not, therefore, fix the level of intelligence as it is commonly measured.

Evidence dissonant with fixed intelligence came chiefly from three sources: from the studies of identical twins reared apart; from repeated testing of the same children in longitudinal studies; and from studies of the effects of training.

First, the case of identical twins reared apart as evidence to support that environmental opportunities can account for substantial differences in measures of intelligence with the gene pool held constant has been demonstrated by Newman, Freeman and Holzinger (1937). Most of the other studies of identical twins reared apart (Muller, 1925; Saudek, 1934; Yates and Brash, 1941; and Burks, 1942) add little to the information from this classic study. The fact that differences of 24 and 19 points were found in two of their pairs of twins should probably be accepted as evidence that variations in educational and social opportunities can have an effect upon IQ of this order of magnitude. If the variation in opportunity were exaggerated further, the difference in IQ might possibly be even larger.

Second, the studies of the constancy of IQ within individuals have posed a severe challenge for the

assumption of fixed intelligence. These studies are of two kinds. One kind is concerned with the stability with which individuals maintain their positions within a given sample of subjects from one testing to another testing, separated by various intervals of time. Another kind is concerned with the variations of IQ within specific individuals (in Hunt, 1961).

Third, the studies of the effects of schooling were an attempt to get evidence concerning the effects on later intelligence of experimentally controlled experiences at various ages. In general, the design of such studies is to compare the change in IQ performance from a group that has had training with the change in performance from a group that did not have the training.

Many studies have been carried out on the effects of schooling on IQ's of school-aged children (Lorge, 1945; Vernon, 1948; Thorndike, 1948; De Groot, 1948, 1951), and the results certainly suggest that, to quote Lorge, "schooling makes a difference". Studies comparing the effects of nursery school and orphanages too were carried out. The nursery school presumably provides an unusually stimulating environment while the understaffed orphanage provides an unusually unstimulating environment. Probably the first report of an improvement in the intelligence from nursery school came from Wooley (1925). It was followed by Barrett and Koch (1930) and by Ripin (1933) in which the test performance of orphanage children was raised by nursery schooling.

Little is known concerning how much and in what way later learning depends upon early learning. What is

known comes largely from the work stimulated by the theorising of Hebb (1947, 1949). Expectations are confirmed not only that deprivation of experience diminishes ability, but also that an enrichment of experience improves ability (Hebb, 1949).

Goslin (1963) divides environmental influence on an individual's test score into four interrelated variables: cultural background, formal training, experience with similar tests, and the physical condition of the testee. While all of these are important, the relative influence of each in any particular situation depends in a large part on the specific demands of the test.

The question of effect of cultural, environmental or personality factors in increasing or decreasing general intelligence, is of first importance for educators. If either home or school environments can be provided that facilitate development of mental ability, then there exists a tremendous tool for the improvement of human welfare.

Basic to this question is another assumption underlying the tests of general intelligence, namely, that any test item purporting to measure intelligence rather than education (as Binet and others have wished) must be a part of the normal culture presented to the child in the course of his growing up.

If all children have not been exposed to the idea in question, then success or failure on the test item may be a function of the child's environmental exposure rather than his ability to show intelligent

behaviour. Culture-bound items will not provide a proper test for persons not exposed to that culture.

As instigated by Binet, intelligence tests have always been used as predictors of scholastic aptitude or school success. On this theory they do fairly well, as school curricula are now constituted. But this type of validity is essentially a static one.

According to Vernon (1968), within the cultural group for which they were devised, intelligence tests are of considerable predictive value, educationally and vocationally, not because they are measures of innate potentiality, but because they sample useful mental skills. Vernon claims that we can, to some extent, predict the future, though certainly not with complete accuracy, since the future environment may be more or less stimulating than in the past, or changes in the individual's personality adjustment may effect his cognitive growth.

Potential ability is a theme which keeps on cropping up in present day educational, sociological and political discussions. As Vernon (1968) points out, potential ability, in the light of his own and others' researches, is not something which psychologists can measure scientifically (as they used to believe), but is something beset with doubts and difficulties and hence merits very careful re-scrutiny. Vernon explains potential ability at its simplest stating that it "... implies that many adults and children could achieve better than they do, only that they are handicapped by various conditions such as poverty, ill-

health, malnutrition, inadequate schooling, maladjustment or laziness, and so on". That is, people have potential ability which is going to waste, or is not being fully realised.

In Vernon's view, in order to more accurately assess an individual's potential, the psychologist should attempt to give quite a wide range of varied tests, verbal and non-verbal, including any that he can get across to the particular pupil, and should simultaneously obtain a detailed case study of the pupil's background, education and linguistic history, present situation and behaviour.

This is particularly true in the case of the mental retardate whose specific area/s of malfunction may not otherwise be easily ascertained, thus possibly masking some ability or aptitude with which useful tasks or work could be accomplished.

2.4 SOCIAL LEARNING THEORY

A difference in the ability to learn a task is the most consistently observed quality of the mentally subnormal. An excellent summary of studies contrasting the learning ability of persons with less than average intelligence and those of average intelligence is presented by Lipman (1963). As a group, the mentally subnormal take longer to learn a task, reach peak performance at a lower attainment level, and seem to retain less.

McMaster (1973) speculates that if this is translated into educational terms it could then be suggested that the mentally handicapped need essentially a similar educational program as that for normal children, except that it should be in smaller doses and at a slower pace. It is probable, at the present time, that this is the principle upon which the way of educational programs are constructed for the mentally handicapped. This means an acceptance that the essential difference between the mentally handicapped and the normal in terms of learning, is quantitative.

It is clear, however, from a considerable amount of research over the last ten years that such a view is not only over-simplified, but in many cases quite erroneous. This is so because the deficiency of the mentally handicapped child is related only to certain areas of the learning situation, and these may be specifically defined (McMaster, 1973). There are considerable individual differences, so that explanations of these differences must take into account the degree of mental subnormality and individ-

ual variations in relevant personality traits (Clarizio and McCoy, 1970).

In his detailed analysis of performance in various situations and with varied tasks, Maher (1966) emphasises the influence of previous experiences, the nature of the task, and the procedures used to measure learning as contributing to the generally poor performance of the mentally handicapped. Irrespective of what factors may be influencing the outcomes, the mentally subnormal are identifiable on the basis of performance in learning.

There are many general behavioural laws which are applicable to both the mentally handicapped and their normal counterparts and as Baumeister (1967) states: "We can expect retardates and normals to respond in qualitatively and even quantitatively the same manner to many variations in their environments".

Good examples of studies which suggest that there is a qualitative difference in certain abilities are those in which intelligence test performances are similar in terms of mental age between the mentally handicapped and the normal child (Girardeau, 1959; Baumeister, Beedle and Hawkins, 1964).

In this type of study the mentally handicapped children are matched with normal children in terms of mental age, suggesting that their level of intelligence is the same. However, this does not mean that the children equated in this way are exactly similar. The fact that the mental age represents the sum of various successes in different areas of "intelligence", for example, perceptual tests, comprehension and

memory, makes it extremely complex to make comparative studies of normal children with sub-normal children - complex at any rate, to discover the cause of differences or similarities (McMaster, 1973).

It should be recognised that most mentally retarded preschoolers have the same array of physical, social and emotional needs as the non-retarded. The obviousness of their needs may be more noticable than with normal children because the retarded are usually less adept at dealing with their own feelings and their surroundings. As a general rule of thumb, one can expect the retarded child's physical characteristics and needs to be closer to his chronological age than to his mental age, and his social and emotional requirements to lie somewhere between his chronological and mental ages (Smith, 1971).

The development of self-concept depends to a large extent on the degree to which the retarded teenager has experienced success and to how many continual encounters with failure have been a part of his earlier development. This implies that the types of goals which the individual has imposed on himself, or accepts for himself, will tend to enhance or detract from the establishment of a healthy view of self. If the goals are too long-range, too difficult to realise or improper, and modifications in them do not occur, the child will perpetually fail and lose faith in himself and in his ability to subsequently perform in a reasonable and satisfactory way.

The behavioural management approach to influencing the behaviour of young children with developmental difficulties is based on principles of social learning and related

concepts of behaviour development and change. The major concept underlying the approach, that of positive reinforcement, emphasises the positive, humanistic orientation of the approach. The major premise suggests that a child can best acquire a wide range of desired behaviour patterns, including emotional and attitudinal ones, in an environment which emphasises the consequences of desired behaviour and which keeps negative consequences at an absolute minimum (Gardner, 1974).

Behaviour modification is defined as the application of behaviour principles to the training and treatment of problem behaviour in general. The effective use of behaviour modification techniques has implications for an analysis of retarded development (Bijou, 1971; Bijou and Orlando, 1961).

Behaviour therapy, a recent treatment approach, seems to have appreciable potential as a reality-based intervention. Clarizio and McCoy (1970) briefly summarised the goals of environmental modification:

1 Guiding mental attitudes into socially acceptable channels.
2 Restoration of self-confidence and personal security.
3 Replacement of discouragement with encouragement.
4 Establishment and promotion of good work habits.
5 Increasing opportunities for socialisation.
6 Learning of specific skills needed for work or school.

Allen (1974) points out that the most powerful determinant of behaviour in all young children is the attention of significant adults in the environment

(Harris, Wolf and Baer, 1966). To date, this is the single most unifying theme found in early childhood behaviour modification research.

As each child successfully expands and improves his reportoire of skills, and as these become more intrinsically reinforcing, he requires less and less in the way of external praise and "rewards", and his total behaviour shows qualities usually summarised as self-confident, happy, bright, creative, capable and secure. Behaviours such as these which are considered the hallmark of sound personality development, bring each child and the adults in his life immediate satisfaction, and make more probable his love of learning and his sense of self-worth during his years of growing up.

Basic principles of learning operate at all levels of intelligence. From the point of view of the applicability of learning principles, there are no inherent differences between the normal and retarded, regardless of degree of retardation. Certainly, genetic and physiological conditions set limits on the speed of acquisition and on a child's ultimate response reportoire, but learning can take place and does take place according to the same principles whether the learner be profoundly or mildly retarded. Kingsley (1968), for example, demonstrated that on an association-learning task, a group of educable mentally retarded children performed in a qualitatively similar manner to other groups, while Morgan (1969) showed there is no difference in responsiveness to stimulus complexity at different levels of intelligence. As Ullman and Krasner (1969) have stated, not even the most severe defect rules out responses to the environ-

ment and alteration of behaviour through training. From this point of view it makes no sense to differentiate between the trainable and the educable - a pseudo-classification which we must remind ourselves is simply another arbitrary cutoff on the continuum of intelligence test scores that is no more valid than the discarded idiot, imbecile, moron dichotomy (Ross, 1974).

The application of behaviour modification techniques to the training of the mentally retarded can be dated from the study of a profoundly retarded nonambulatory patient (Fuller, 1949). Since that time, and particularly within the last half of the current decade, behaviour modification has assumed increasing importance as a treatment concept in the field of mental retardation (Gardner, 1968). This phenomenon can be related to events occuring within the field of mental retardation (for example, controversies over pseudo-feeblemindedness; emphasis on adaptive behaviour); within the field of psychology (for example, the growing dissatisfaction with the medical model, operant conditioning with institutionalised psychotics); and within the federal government (research grants) (Gardner and Watson, 1969).

In general, behaviour modification studies of the mentally retarded have dealt with two major areas: self-help skills and social skills (Gardner, 1971). Broadly defined, self-help skills refer to basic skills which an individual requires in order to function independently, even in the simplest environments. Self-help skills include walking, eating, dressing, personal hygiene, toileting etc. Developmentally, self-help

skills emerge in normal children during the infancy and early childhood period, and are usually well developed by the time the child reaches school.

Demonstration of the applicability of principles of learning at even the most profound level of retardation can be found in the work of Bailey and Meyerson (1969). Operant behaviour modification techniques have been applied with other retarded children to establish toilet training and such basic skills as feeding and dressing. Giles and Wolf (1966), for example, through the use of positive reinforcers strengthened appropriate use of the toilet of five institutionalised severely retarded males. Beyond learning simple self-care skills, retarded children with IQ test scores as low as 30 have acquired appropriate classroom behaviour (Birnbrauer, 1967); socially acceptable behaviour (Girardeau and Spradlin, 1964); social skills (Baldwin, 1967); and academic subject matter (Birnbrauer, Bijou, Wolf and Kidder, 1965). The reason for referring to these studies is not to stress the effectiveness of operant procedures, but to emphasise that the same principles of learning apply regardless of the degree of a child's retardation, and that establishing this degree in terms of test scores becomes a very secondary matter.

It was Zigler (1966a) who pointed out the differential effectiveness of reinforcers with retarded children, particularly institutionalised retarded children, as compared with normal children, for this difference can account for many of the performance deficits of retarded children. In fact, the differences appear to be a function of institutionalisation itself.

In a series of studies Zigler (1966b) and his co-workers

have shown that the effectiveness of social reinforcement is a function of the retardates' pre-institutionalised background. While the social deprivation which characterises the institutional setting tends to make social reinforcement more potent for all institutionalised children, this effect is enhanced for those who come from relatively non-deprived homes, as compared to those from more socially deprived backgrounds. In the long run, institutionalisation is more socially depriving for children from good, than for children from poor, backgrounds, and follow-up studies (Zigler and Williams, 1963; Zigler, Butterfield and Capobianco, 1970) demonstrate a decrease in social-reinforcer effectiveness that is greater for those with deprived pre-institutional histories. It thus appears that children from better backgrounds continue to be motivated by attention, praise, affection, and other social reinforcers, while for those from poorer backgrounds, these consequences gradually cease to be effective in maintaining behaviour.

When social reinforcers are ineffective, more tangible reinforcers, such as trinkets or food, can be used to reward behaviour. Thus Zigler and de Labry (1962), who found performance differences between normal and retarded children on a concept-switching task, demonstrated that when the consequences of success were changed to tangible reinforcers, these differences disappeared. When an effective reinforcer is used, deficient performance can often be overcome - bearing out the contention that it is at least as important to assess what constitutes a reinforcing consequence for a given child as to know how many correct responses he can give on an intelligence test or to see what kind of pattern his EEG tracings make on a piece of paper (Ross, 1974).

Various types of social behaviours have been developed in the retarded, using behaviour modification techniques. Buell, Stoddard, Harris and Baer (1968), increased the use of outdoor play equipment by a three year old girl through contingent teacher attention.

Other examples of research with retarded children are cited in Bijou (1971) and include the problem areas of body management and locomotion (Meyerson, Kerr and Michael, 1967); eating behaviour (Wolf, Risley and Mees, 1964); toilet training (Wolf, 1965; Giles and Wolf, 1966; Wolf, Risley, Johnston and Harris, 1967); speech development (Sloane and MacAulay, 1968); and self-destructive behaviour (Wolf, Risley and Mees, 1964; and Lovaas, Freitag, Gold and Kassorla, 1965). Token systems were successfully used with four to seven year old moderately retarded children attending a pre-school program (Baker, Stanish and Fraser, 1972); in classes for children described as severely retarded (Birnbrauer and Lawler, 1964); and in hospitals for the retarded (Hunt, Fitzburgh and Fitzburgh, 1968). (See Kazdin and Bootzin, 1972; and Kazdin, 1972). Goodkin (1966) found that while the tangible quality of tokens has been useful in working with low functional level aphasics, high level patients responded much better to verbal reinforcements.

Many investigators (Dollard and Miller, 1950; Ellis, 1963; Kelly, 1965; Lazarus, 1966b; Mandler, 1962; Schachter, 1966) have argued for the important role which the clients cognitive appraisal, expectation, self-labels, etc., play in the handling of stress and in the modification of behaviour.

Therapeutically attending to the patient's self-verbalisations as well as his overt maladaptive behaviour has led to significant behavioural change,

greater generalisation, and greater persistence of treatment effects.

In an article by Meichenbaum and Goodman (1969b),it is noted in a number of observations that children often talk to themselves and that speech-for-self often seems to serve the function of orienting or directing the child's behaviour. The results of Meichenbaum and Goodman's study suggest that the development of speech-for-self way contribute to the conceptual or cognitive style of the child. Present research is being conducted to examine the developmental trends of speech-for-self verbal control of behaviour and cognitive styles. It is suggested that socialisation factors (Bandura and Walters 1963b) play an important role in the development of speech-for-self and cognitive styles.

Meichenbaum (1969a) in his article on the effects of instructions and reinforcement of thinking and language behaviour of schizophrenics, finds that operant conditioning may modify attentional responses by causing the schizophrenic to shift his attention from internally generated stimuli. This finding is consistent in the growing literature on the application of operant programs in modifying behaviour of schizophrenics (Davison, 1967).

Data from a wide range of studies (Bein, 1967; Kohlberg et al, 1968; Lovaas, 1964; Luria, 1959, 1961; Meichenbaum and Goodman, 1969a, 1969b) provide support for the age increase in cognitive self guiding private speech, and the increase in the internalisation with age. These results suggest a progression from external to internal control. Vygotsky

(1962) and Luria (1961) proposed that early in development, speech of others, usually adults, controls and directs a child's behaviour. Somewhat later, the child's own overt speech becomes an effective regulator of behaviour; and still later, the child's covert or inner speech can assume a regulatory role. From this hypothetical developmental sequence, Meichenbaum and Goodman (1971) developed a paradigm which was successfully used to train impulsive children to talk to themselves as a means of developing self-control.

In a pilot study, schizophrenics have been successfully trained to talk to themselves in order to improve their performance on attention and cognitive tasks. Using the same modelling and overt to covert cognitive rehearsal paradigm as the impulsive children received, schizophrenics were trained to use such self-instructions as "pay attention, listen and repeat instructions, disregard distraction". The cognitive self-guidance training resulted in a significantly improved performance on such tasks as a digit distraction recall task and a digits symbol task.

Thus, results indicate that a cognitive self-guidance program which trains impulsive children to talk to themselves is effective in modifying their behaviour on a variety of psychometric tests which assess cognitive impulsibility, performance IQ and motor ability. It was found that the addition of explicit self-instructional training to modelling procedures significantly alters the attentional strategies of the impulsive children and facilitates behavioural change. The impulsive children were taught to use their private speech for orienting, organising, regulating and self-

rewarding functions with the consequences of greater self-control. Schaffer (1947) defined this therapy as a "learning process through which a person acquires an ability to speak to himself in appropriate ways so as to control his own conduct". Farber (1962) indicated "the one thing psychologists can count on is that their subjects or clients will talk, if only to themselves; and not infrequently, whether relevant or irrelevant, the things people say to themselves determine the rest of the things they do".

Criticism (for example Breger and McGaugh, 1965), has been directed toward the behaviour therapist for not giving the role of cognitions its due place in the modification of behaviour. The present line of research illustrates that this need not be the case. In fact, it demonstrates that cognitive processes are amenable to modification and that such modification enhances the efficacy of behaviour therapy. The private speech of the client may be subjected to the same modification procedures (modelling, reinforcement, aversive consequences, imagery procedures) that are used for modifying overt behaviours. Evidence (Krasner, 1962; Truax, 1966) has convincingly indicated that the therapist can and does significantly influence what the client says to him; now it is time for the therapist to directly influence what the client says to himself.

It has also been found that the self-instructional procedure seems applicable to the culturally deprived child, who has been described by Bereiter and Engelmann, (1966) and Blank and Solomon, (1968, 1969) as having a "central language deficit", namely the inability to relate what he says to what he does. The deprived

child does not spontaneously use language to direct his problem-solving behaviour, especially when specific demands to do so are removed, nor does he exhibit normal capacities for self-control.

A heuristic assumption underlying this line of investigation has been that symbolic activities obey the same psychological laws as do overt behaviours, and that private speech is teachable. Thus, it remains to be seen in future research whether behaviour modification techniques which have been used to modify overt behaviours may be applied to cognitive processes.

Recent research (Janis and Mann, 1965; Lazarus, 1966; Mann and Janis, 1968; Sarason, 1968; Wagner, 1968) has indicated role-playing may be a valuable procedure to modify behaviour, particularly interpersonally oriented behaviour. None of the role-playing studies has directly evaluated the theoretical mechanisms that account for behaviour changes occuring through role-playing.

The few published accounts of the use of role-playing with retarded patients tend to be enthusiastic (Lavalli and Levine, 1954; Long, 1969; and Sarbin, 1945). Pilkey, Goldman and Kleinman (1961) obtained empirical evidence that participation in psycho-drama tended to improve the ability of retarded adolescents, to predict self-evaluation made by other adolescents and the way in which they themselves were seen by those teenagers.

The use of peer group influences enhances the acquisition of modified behaviours in the retarded by providing them with a variety of role models in a diversity of work roles and with a repetition of essentially the

same behavioural messages and reinforcers from individual peer group members (Hartlage, 1974). Ross admonishes that an institutional setting where other children tend to model inappropriate behaviour is thus not the place to attempt treatment by vicarious learning. In fact, as Estes (1970) has suggested, one source of the behavioural deterioration found in children who are institutionalised for long periods of time, such as mental defectives, may be the presence of inappropriate peer models whose influence is counter-therapeutic.

Modelling or observational learning is a central concept in theories of social learning (Bandura, 1969b). Bandura (1965b) contends that modelling procedures represent a more effective means for the acquisition of new behaviour patterns than does an operant-conditioning paradigm based on positive reinforcement. Moreover, once a behaviour is acquired through imitation, it can often be maintained without external reinforcement, since humans learn to reinforce themselves for behaving in certain ways. As an intervantion technique modelling is based on the premise that a child will imitate the behaviour of others. It is an important technique, in that the learning of social skills in children is commonly acquired through examples of socially approved behaviour presented by suitable models. Therapists and school teachers, as models, thus have considerable opportunity to influence the behaviour of children (Clarizio and McCoy, 1970).

O'Connor (1973) feels that modelling is the most direct, common sense and effective way to teach and to demonstrate, show, or give an example of the skill or item of knowledge that is new or novel to the child.

Modelling has been referred to as imitation, learning, observational learning, vicarious learning, no-trial learning and matched dependent learning, to suggest various aspects of modelling phenonema and attempts to explain its mechanisms. Modelling involves the learner or child observing a model or teacher enact or perform the behaviour or skill (in Cull, 1974).

There are three main effects of exposure to models (Bandura and Walters, 1963; Bandura, 1965b): the modelling effect: through the modelling effect, children come to acquire responses which were not previously part of their behaviour; the inhibitory effect: the strengthening or weakening of inhibiting responses already existing in the observer can also be accomplished through modelling procedures; the eliciting effect: the eliciting or response facilitation effect refers to responses that precisely or approximately match those exhibited by the model. Thus, observation of the teachers' responses provides discrimative clues which trigger similar responses already in the pupil's behaviour repertoire. The eliciting effect is distinguished from the modelling effect and the disinhibiting effect in that the imitated behaviour is neither new nor previously punished.

The probability that a child will imitate a model is a function of more than sensory contiguity. Mere exposure to models is no guarantee that the child will imitate the desired behaviours. Attention-directing variables - such as motivational factors, previous experiences in discriminative observation, the distinctiveness of the modelling stimuli, and the expectation of reward or punishment - all contribute to the extent that the child will observe the behaviour exhibited by

the model. The rate, amount, and complexity of the modelling stimuli also influence the amount of the child's imitation (Bandura, 1965a).

An example of the therapeutic application of modelling procedures is the work of Lovaas (1968) on techniques of teaching verbal and non-verbal behaviour to schizophrenic children. In a treatment program for schizophrenic children, Lovaas et al (1966) concentrated their efforts on teaching imitative behaviour so that rather large new behavioural reportoires could be placed at the child's disposal. The more complex the behaviour to be acquired, the more useful the imitation training procedure has been. This is particularly true in the case of speech development (in Lovaas et al, 1974).

There are a variety of theories of imitation (for example, Humphrey, 1921; Allport, 1924; Miller and Dellard, 1941; Mowrer, 1960), which suggest various hypotheses for the emergence of novel responses. Experimental work (Bandura and Walters, 1963b) gives strong support to acquisition of both adaptive and maladaptive behaviour through modelling. Modelling is very obvious in the behaviour of young children. Most children learn to speak, ride bicycles, identify with their sex, and so forth, by imitating the actions of others. The use of a model can be a constructive way to build up desirable behaviours in children.

In Friedman (1971) it is seen that in the last few years a number of studies have established the effectiveness of modelling as a behavioural change procedure (Bandura, Blanchard and Ritter, 1969; Bandura, Grusec and Menlove, 1967; Bandura and Menlove, 1968;

O'Connor, 1969; Ritter, 1968, 1969a, b). With the exception of the study by O'Connor, however, most of this research has been conducted on non-interpersonally oriented behaviours such as fear of animals and heights.

While modelling procedures continue to develop and evolve they may be considered effective as methods of modifying behaviour, both with respect to their impact upon the clients with whom they have been used as well as the ease with which they can be learned and applied by group workers (Ganzer, 1974).

2.5 ENRICHMENT PROGRAMS

The majority of enrichment programs have been designed for the deprived normal, rather than retarded, child. However, as has been indicated in earlier sections of this work, the psychological development of the mental retardate follows the same pattern as that of the normal child in many respects, albeit at a slower pace. Consequently, the observations attained from enrichment programs on deprived normal children are also relevant to mentally retarded children.

Research conducted within the framework of social learning (Bandura, 1965c) provides substantial evidence that modelling variables play a highly influential role in the development of social response patterns, and their position with respect to language seems almost unique.

Bandura (1965c) states that the most plausible explanation of modelling involves the ability to influence the behaviour of another by controlling or mediating his positive and negative reinforcements. The secondary reinforcement value of the model is thereby increased through repeated association (direct or vicarious) with positive reinforcement. The pairing should increase both approach behaviour and modelling (Bandura, Ross and Ross, 1963).

Educators are becoming more aware of the need to provide programs which facilitate social and emotional development. A program of activities concerned with developing understanding of self and others, titled DUSO, focuses on social and emotional learnings.

Dinkmeyer, the author of this program, states that "only as the child understands himself, his needs, his purposes and his goals, is he free to become involved and committed to the educational process" (Dinkmeyer, 1970).

In support of the body of opinion which stresses environmental rather than maternal loss to be responsible for deficits in the intellectual development of deprived children, there seems to be an increasing involvement in enrichment models for intervention to ameliorate environmental inadequacy (Deutch, 1963, 1964, 1967; Klaus and Gray, 1968; Miller, 1970). There is much evidence that these programs might reasonably improve intellectual and social skills.

A comprehensive review of different techniques for modifying the child's intellectual development is covered by Fowler (1962) who concludes that specific training has produced large gains, regardless of whether learning came early or late in development. In a recent survey of preliminary findings of current pre-school programs, Weikart (1967) has suggested the development of highly structured programs which emphasise cognitive and language development. He feels these are necessary to achieve accelerated growth and to correct the cognitive and intellectual deficits of deprived children.

The emphasis on language in enrichment programs is derived both from direct observation of differences in the language performance of disadvantaged and middle class children (Bernstein, 1961; Deutch, 1965; Goldfarb, 1945; Hess and Shipman, 1965; Jensen, 1969)

and from initial acceptance of verbally loaded IQ scores as a measure of success of intervention (Glaser and Resnick, 1972). Much more detailed work in the area of language instruction has been done by Bereiter and Engelmann, (1966), Blank and Solomon, (1968, 1969); and Cazden (1968).

There are different ways of viewing the use of enrichment programs. Bereiter and Engelmann (1966) feel that even in its purest form, the enrichment strategy seems doomed to failure - that is, if success is judged not on the basis of the disadvantaged child's progress, but on the basis of his demonstration that he is catching up to the more privileged child. The reason they give is simply that while the disadvantaged child is going through those experiences that privileged children have gone through before him, and hopefully is learning from them what the privileged children learn, these same privileged children are not standing and waiting for him to catch up but are having new experiences and learning new skills from them. Were it not for the time limitations involved, Bereiter and Engelmann state that the enrichment strategy would be perfectly adequate.

A basic conclusion of Jensen's discussion of the influence of environment on IQ, is that the environment acts as a "threshold variable". Extreme environmental deprivation can keep the child from performing up to his genetic potential, but an enriched educational program cannot push the child above that potential (Jensen, 1969).

Results of marked IQ gains were found for groups of deprived children receiving specialised training programs to facilitate abstract thinking (Blank and

Solomon, 1968), logical thinking (Osborn, 1968) and learning of meaningful verbal material (Ausubel, 1960; Ausubel and Fitzgerald, 1961). Other investigations have been quite inconclusive. For example, Tallmadge (1968) found no significant interactions between training methods and any combination of a number of aptitude measures. Gagnė and Weigand (1968) also found no significant interactions of any instructional treatment with mental ability. Zigler and Butterfield (1968) demonstrated that a significant portion of IQ gain from special intervention programs could be attributed to motivational and social factors rather than to cognitive factors.

Regarding motivational factors - it has been found that deprived children are more motivated to securing the attention and praise of adults (Stevenson and Fahel 1961; Zigler, 1963) than are children not deprived. It has also been found that a child who has positive experience with a particular adult is more responsive to the social reinforcers dispensed by that adult (Berkowitz and Zigler, 1965; McCoy and Zigler, 1965).

Gordon and Wilkerson (1966) suggest that such a variable as self-concept may not be an important dimension of the problem, since either positive or negative self-regard may be related to high achievement. With a word of caution in mind, it can be said that disadvantaged children do evidence significantly lower self-esteem than more advantaged children (Burnes, 1970). The importance of self-concept and its influence on motivation, achievement and behaviour is recognised by numerous psychologists and educators. Among them are Combs, Avila and Purkey (1971), who stated that "the most important factor affecting be-

haviour is the self-concept". Other writers (Coopersmith, 1959; Dinkmeyer, 1970; Meeks, 1968; Morse, 1964) also concur as to the importance of self-concept to behaviour and learning. The full impact of negative self-concept upon learning is difficult to assess, but a number of studies have indicated that few factors are more relevant to the child's academic success and social development than his feelings of personal adequacy and self-acceptance (Coopersmith, 1959; Dinkmeyer, 1970). Dinkmeyer (1970) stresses that it is crucial for the self-esteem of the child to be built up in order to meet his social, emotional and academic needs.

In his DUSO program, Dinkmeyer (1970) utilises modelling of appropriate behaviour (lacking in the child's background) and the climate is marked by identification, recognition, acceptance and appreciation of individual differences, with an emphasis on the importance of self-evaluation.

3. METHOD

3.1 Subjects

At the beginning of the experiment, the control and experimental groups each comprised of 18 mentally retarded children. However, during the study 4 children dropped out so that finally there were 15 left in the experimental group and 17 in the control group. The experimental and control groups were each sub-divided into 3 sub-groups having approximately equal numbers in each sub-group, thus keeping them small enough to allow individual attention during the administration of the programs.

The subjects selected for the study were drawn from those children attending the special school of the institution. They were matched for sex and social behaviour, the majority having similar socio-economic backgrounds.

In addition to the primary classification of "mental retardation", there were other criteria related to the instructional potential of the children which reduced the number of cases that were available for the present study. In particular, the subjects were largely selected on the basis that they probably had potential to benefit from the program, that is, they were considered to be trainable. All children who manifested severe visual or auditory handicaps, spasticity, uncontrollable epileptic seizures or who presented such serious behaviour problems as to be considered unteachable, were eliminated from consideration in the present study.

Classifications of the subjects as to type/degree of

		EXPERIMENTAL		
		Mean	Std. Dev	Range
Chronological Age		13y 1m	2y 8m	5y10m - 16y 9m
Length of Instit.		4y 4m	3y 2m	0y 2m - 12y 1m
IQ	OSAIS	55.7	9.294	42-74
	DAM	55.0m	10.447m	40-76m
MA	OSAIS	81.1	16.761	57-103
	DAM	82.4m	22.446m	48-141m

		CONTROL		
		Mean	Std. Dev.	Range
Chronological Age		12y 10m	2y 10m	7y 6m - 16y 4m
Length of Instit.		3y 10m	3y 4m	0y 3m - 11y 5m
IQ	OSAIS	54.4	9.585	36-76
	DAM	51.9m	11.025m	38-79m
MA	OSAIS	78.7	18.947	42-110
	DAM	76.2m	23.142m	48-114m

Table 1. Means, SD and Ranges of Chronological Age, Length of Institutionalisation, IQ and MA of Experimental and Control Groups

mental retardation were obtained from their case history files. In addition, the subjects were re-classified on the 1973 AAMD definition of degree of mental retardation, based upon their initial test scores on the OSAIS. Both classifications for all the subjects are presented in Table A1.

Originally, it was hoped to match each child in the experimental group with a control subject in respect of chronological age,classification, social behaviour, sex, length of institutionalisation, socio-economic background and education. It was not possible to achieve this matching on a one-to-one basis, primarily because of the limited number of cases available. Nevertheless, the composition of the groups with regard to the above-mentioned variables was made as equal as possible (see Tables A2 to A3).

The means, standard deviations (SD) and ranges of values of chronological age; and length of stay in institution; IQ's and mental age (MA) of both experimental and control groups are shown in Table 1.

3.2 Tests

3.2.1 Test Selection

In the majority of studies with mentally retarded children, a number of psychometric instruments are employed to assess their functioning. Most of these have been standardised on American subjects and thus the norms cannot be regarded as completely valid and applicable to South African subjects.

Two such tests that were originally considered for investigation of the present study were the Wechsler Preschool and Primary Scale of Intelligence (WWPSI) (Wechsler, 1967) and the Wechsler Intelligence Scale for Children (WISC) (Wechsler, 1949). Besides the problem with norms, an added disqualifying factor in the WWPSI is that it can only be used for children over age 4 but sets its ceiling at 6 years of age. Beyond this age the WISC is commonly used, but the sub-tests in this test differ slightly from the WWPSI Scales.

A test which evolved from Burt's Individual Scale and from Terman's Revision of the Binet Test, and appeared to satisfy all the criteria for inclusion in this experimental investigation, is the Individual Scale of the National Bureau of Educational Research (OSAIS) (Fick, 1939). Asher and Schonell (1950) said of this test that it is as adequate as the Terman Scale.

The Individual Scale (OSAIS) is standardised for both English and Afrikaans speaking children in South Africa from ages 7 to 16 years. In addition, according to

Fick (1939) this test was originally designed for the diagnosis of feeblemindedness and subnormality, and is therefore a more accurate assessment of the intelligence of mentally retarded children. Included in this test is a variety of progressively more difficult verbal and non-verbal problems (mainly verbal) which provide added interest for the child who might otherwise become frustrated or bored.

Another test reputed to be of great use is the Goodenough Draw-a-Man Test (DAM) which, according to Anastasi (1952) correlates highly with "general intelligence". The mean scores obtained on this test also correlate more validly with the abilities of retardates than other children (Rohst and Haworth, 1962).

Most correlations between the Draw-a-Man Test and the Revised Stanford Binet Intelligence Scale have revealed a moderate correlation (.40 to .70) between tests (Ausbacher, 1952; Harris, 1963; Kennedy and Lindner, 1964).

The literature shows that drawings of people have been used widely as projective techniques for assessing personality, and it has thus seemed reasonable to expect children with difficulties in interpersonal relationships to obtain lower scores on tasks involving the human figure than on other intelligence tests. Indeed several authors (Brill, 1937; Hanvik, 1953; and Hinrichs, 1935) reported that emotionally maladjusted and brain-damaged children received lower scores on the Goodenough than on the Binet or Wechsler tests.

Thus, it was decided to use the DAM to assess the non-

verbal performance of the children and to compare it with the scores obtained from the OSAIS.

An important aim of the DUSO program is that of increasing social behaviour of which interpersonal relationships (interaction) is a part. Hence there was also interest in noting whether the interpersonal behaviour of the children - as measured on the DAM - would increase as a result of the administration of the DUSO program.

The primary aim of this study was to examine the effect of the DUSO program on intelligence - hence the reason for selecting the OSAIS and DAM tests to produce different measures of intelligence.

At the same time, however, it was felt desirable to record any changes in social behaviour brought about by the program, without subjecting the children to a third formal test procedure.

Therefore, rating scales for seven selected aspects of social behaviour were devised whereby childrens' behaviour could be assessed by the teachers and experimenter from observations of their everyday activities.

3.2.2 Test Description

3.2.2.1 Individual Scale of the National Bureau of Educational Research (OSAIS).

The OSAIS is made up of an extended series of tests in the nature of problems, success in which demands the exercise of intelligence. The scale is graded in difficulty so that the easiest lie well within the range of normal 3 year old children, while the hardest tax the intelligence of the average adult.

The tests are of many different types - some of them designed to display differences of memory, others differences in power to reason, ability to compare, power of comprehension, time orientation, facility in the use of number concepts, power to combine ideas into a meaningful whole, the maturity of apperception, wealth of ideas and knowledge of common objects. For a full set of test questions, see Appendix 11. The instructions of the Individual Scale are published in the original article (Fick, 1939) and in a special manual.

The subjects are asked the questions (items) and given a reasonable amount of time to answer without prompting from the tester. The final score is obtained from the number of items passed or presumed to be passed, and is converted to a mental age according to a table on the back of each test questionnaire. The IQ is then calculated from the mental age and chronological age in the usual manner.

3.2.2.2 Goodenough Drawing Test of Intelligence - Draw-a-Man (DAM)

In this test the subject is presented with a pencil and clean sheet of paper, and is asked by the tester to draw a person - any kind, man, woman, boy or girl - to the best of his ability.

The test is scored by awarding marks to the completed drawing according to the marking criteria of Goodenough. The final score is converted to mental age using the Goodenough conversion formula: MA= 36+(score$\times$3) months where $1 < score < 40$.

3.2.2.3 Social Behaviour Rating

Ratings of the children in both groups were obtained by continuous observation of their behaviour throughout daily school activities. These assessments were made independently by both the experimenter and teachers. However, because of the subjective nature of such observations, correlation tests were performed on the ratings to check that there was inter-experimenter reliability so that the data obtained could be used.

The scores were made according to the scales defined below for the 7 chosen aspects of behaviour.

(i) General Behaviour: the overall manner in which the child conducts himself during DUSO sessions and other school hours.

(ii) Interaction: the general integration of the child with his peers and with the staff, ranging from a high level of sensitivity to, and ability to meet, the diverse interpersonal needs of others, to utter imperviousness to, and disregard for, these interpersonal desires.

(iii) Confidence: the measure of self-assuredness of the child, ranging from bold and impudent to shy and withdrawn.

(iv) Attention Span: the length of time the child is able to concentrate on a particular story or lesson, ranging from complete attention throughout the lesson to susceptibility to the most trivial distraction.

(v) Co-operation: the extent to which the child assists someone achieve a goal, ranging from as full help as possible to no effort at all.

These 5 aspects of behaviour are rated on the scale below:

7 Excellent
6 Very Good
5 Better
4 Good
3 Fair
2 Bad
1 Very Bad

(vi) Interest: the extent to which a story or lesson intrigues the child. The upper end of the scale occurs when the pace or novelty of the subject matter is so low and interest so high that constructive frustration is reached - the child wants more than he is getting. The low end of the scale occurs when the pace is too fast for the child to follow or comprehend, and interest wanes.
Scale:

5 Very Frustrated
4 Frustrated
3 Very Interested
2 Interested
1 Uninterested

(vii) Understanding: the extent to which the child realises what is happening. The upper end of the scale occurs when the child grasps subtle concepts not directly related; the scores decreasing through the stages of comprehending well; having shallow knowledge of what is happening; through rote memory (knowledge acquired by repetition); to susceptibility to any prompting, right or wrong.
Scale:

5 Deep understanding
4 Good understanding
3 Some understanding
2 Rote memory
1 Susceptibility to prompting

3.3 Programs

3.3.1 The DUSO Program

DUSO stands for Developing Understanding of Self and Others. It is a program of activities, with an accompanying kit of materials, designed to help children better understand social-emotional behaviour. DUSO is designed for use with kindergarten and primary-aged children. DUSO may be used by teachers and others as a developmental guidance program. The program can be presented effectively without special training.

DUSO is structured so that teachers may use the program on a daily basis throughout a full school year. As an alternative, the teacher may select activities from the total program to fit the specific needs and interests of the group.

The DUSO activities make extensive use of a listening, inquiring, experiential and discussion approach to learning. A variety of activities include story telling, role playing, puppet play, group discussion and supplementary activities. Since the activities are highly varied, the children's interest in the program is maintained.

The total program is organised around eight major themes. Each theme provides the focus for one of the eight units.

The eight unit themes are:

i understanding and accepting self
ii understanding feelings
iii understanding others
iv understanding independence
v understanding goals and purposeful behaviour
vi understanding mastery, competence and resourcefulness
vii understanding emotional maturity
viii understanding choices and consequences

For each unit, there is an introductory story and a unit song which helps focus attention on that unit's theme. These materials, written in the child's language and employing animal-person characters, are provided to stimulate identification and involvement with the content of the various activities.

Following the unit introductory activities, each unit is divided into cycles. Each cycle includes the following set of activities:

1. a story to be followed by discussion
2. a problem situation to be followed by discussion
3. a role playing activity
4. a puppet activity
5. several supplementary activities to be used as desired
6. recommended supplementary reading

The DUSO program is presented fully in a teachers' manual (see references); however for the sake of

completeness, salient points of the program are summarised below.

The kit includes eight puppets, two of which represent the main characters in the program - DUSO and Flopsie.

DUSO the Dolphin puppet is the central character of the DUSO program. DUSO is an understanding listener who helps lead the children to better understanding behaviour. DUSO also helps children take positive action toward solving problems as well as developing better general understanding of themselves and others.

Flopsie the Flounder appears throughout the program in interactions with DUSO. Flopsie is very inquisitive and also provides an identification model for one who changes from being rather indecisive and dependent to one who becomes more self-confident and decisive.

The other six hand-puppets include an adult male, an adult female, two male children and two female children. These puppets are used by the teacher to enact the various puppet dramas on the puppet activity cards and to create original puppet plays.

The text of the DUSO stories and their illustrations are provided in two story books which have been designed for lap presentation. As the teacher holds the book on her lap, the story illustrations are vertical and in full view of the children.

The stories focus on normal developmental concerns of children. Each story is designed:

- to depict situations in which different characters meet life tasks constructively or ineffectively;
- to permit children to identify with the characters in the story;
- to direct the children's attention to a basic concept or theme relating to understanding themselves and others;
- to stimulate discussion about the goals and consequences of the behaviour of the characters in the story;
- to discuss how the children would feel, think and act in a similar situation.

One of the most important types of activity in the DUSO program is role playing which is included in each cycle.

Role playing is the informal dramatisation of a situation, problem, story or scene as presented by a leader. The leader is usually the teacher who sets the scene, selects the children to participate in it and guides the discussion and evaluation at the conclusion of the enactment.

Role playing is both a psychologically and educationally sound technique to use in developmental guidance. The spontaneity and informality of the technique encourages a freedom among children that is condusive to a frank and an honest exchange of ideas. Children have the opportunity to air many of their emotions in relative safety without fear of personal censure.

Understanding of the perceptions of others is encouraged. Role playing provides an opportunity for the

transfer of learning from speech to action. As discussion leader, the teacher encourages the children to become more observant of the behaviour of others, to look for the purposes and causes of behaviour, to anticipate the results of certain behaviour, situations and people.

3.3.2 Structured Program

A special program was drawn up which would provide the control group with a stimulating environment and would give them the same exposure to the experimenter as the experimental group. Various skills were exercised by means of jig-saw puzzles, drawings and cutting-out activities according to the schedule shown below.

Monday:	Jig-saw puzzles
Tuesday:	Reading/looking at magazines
Wednesday:	Drawing and colouring-in
Thursday:	Cutting out selected categories of pictures from magazines, for example, food
Friday:	Combinations of above activities.

3.4 Procedure

(a) The OSAIS and DAM tests were administered to the subjects in both the experimental and control groups prior to the commencement of the programs. The teachers and experimenter independently also rated the children in both groups on the Social Behaviour Rating Scale.

(b) The experimental groups were given the DUSO guidance program over a 2 month period (40 days - approximately 30 minutes per day). This covered eight units of the program using the Introduction and Cycle A of each unit (the first 4 activities as outlined under 'Program' above). See Table 2 for daily DUSO program.

(c) Special sessions were held for the control groups during which puzzles, drawings and cutting-out activities were given. These sessions also extended over a 2 month period (40 days - approximately 30 minutes per day).

(d) At the end of the 2 month period the OSAIS and DAM tests were again administered to both groups, as was the social behaviour rating test.

(e) These same three tests were re-administered after the following 2 month interval during which the children in both groups attended their usual school classes only, that is, no programs were given during this period.

		WEEK							
		1	2	3	4	5	6	7	8
DAY	ACTIVITY	UNIT 1 (Cycle A)	UNIT 11 (Cycle A)	UNIT 111 (Cycle A)	UNIT 1V (Cycle A)	UNIT V (Cycle A)	UNIT V1 (Cycle A)	UNIT V11 (Cycle A)	UNIT V111 (Cycle A)
Mon	Intro-ductory story	The under-water problem solvers	DUSO talks about friends	Captain Blooper's pirates	Prince Lazy Bones	Lefty's Hamburger Stand	DUSO and Squeaker	DUSO and the Worry-wart	DUSO and Flopsie Flounder
Tues	Unit Story	The red and white blue bird	Gordo and Molly	Captain Blooper's cake	Good Guy and Old Lazy	The swing	Thaddeaus Platypus	The new house	The Swing-er slinger train
Wed	Problem Situa-tion	Suzie grows up	Tom and the new ball	The class gets ready	Bobby and the cartoons	Tina and the class play	Robby won't try	A new teacher	Mary can't go bare-foot
Thur	Role playing Activity	The tree house	Let's all share	Little Red Hen	Big trouble	It isn't as hard as you think	What shall I do?	Being afraid	Bonfire
Fri	Puppet Activity	Ginny and Terry	Gordo and Molly	Special!	The box of goodies	The girl who knew what to do	Janie	The doctor	You can't play unless

Table 2. Daily DUSO Program

4. RESULTS

4. RESULTS

At each of the three testing periods - to be referred to as the 'Before' (B), 'After'(A) and 'Follow-up' (F) periods - data were obtained for the experimental (E-group) and control (C-group) groups on the OSAIS and DAM tests and Social Behaviour Rating Scale (see Procedure).

4.1 OSAIS and DAM tests

From the raw data on the OSAIS and DAM tests (Tables A4 and A5*), mental age (MA) and IQ scores were found using the appropriate conversion charts (Tables A13 to A16).

Summaries of the mean, SD and ranges of values of IQ and MA for the E- and C-groups on the OSAIS and DAM tests were compiled (Tables 3 and 4). The changes in mean values (both actual and as a percentage of the 'Before' value) over the three testing periods were also calculated (Table 5). From these three tables, the graphs in Figs. 1 and 2 were plotted so that the overall trends in results could be readily assessed.

For each of the four sets of results obtained, namely, IQ and MA on OSAIS and DAM tests respectively, a 2-way Analysis of Variance for Repeated Measures (ANOVA) was performed, factor A being the two groups, and factor B the three testing periods. If the interaction effect F_{AB} was found to be significant, Simple Main Effects were calculated, followed by Pairwise Comparisons where necessary.

* Table numbers prefixed by 'A' are found in Appendix 1

		IQ					
		OSAIS			DAM		
		B	A	F	B	A	F
EXP	Mean	55.667	58.800	57.467	55.000	57.467	57.801
	SD	9.294	10.517	10.134	10.447	11.237	11.546
	Range	42-74	43-77	37-77	40-76	41-76	45-79
CON	Mean	54.353	54.294	55.824	51.941	51.235	49.588
	SD	9.585	7.679	10.020	11.025	9.378	10.278
	Range	36-76	40-68	38-79	38-79	36-65	33-71

Table 3. Summary of Means, SD and Ranges of IQ Scores of Experimental and Control Groups on OSAIS and DAM Tests

		MA					
		OSAIS			DAM		
		B	A	F	B	A	F
EXP	Mean	81.067	90.200	89.267	82.400	90.800	92.800
	SD	16.761	16.845	16.892	22.446	22.889	21.917
	Range	57-103	63-116	65-112	48-141	54-144	57-141
CON	Mean	78.706	80.647	83.059	76.235	76.765	73.765
	SD	18.947	16.328	16.142	23.142	19.958	16.705
	Range	42-110	48-110	48-112	48-114	51-111	48-99

Table 4. Summary of Means, SD and Ranges of MA Scores of Experimental and Control Groups on OSAIS and DAM Tests

	B→ A	A→ F	B→ F
EXP	+3.13	-1.34	+1.79
CON	-0.059	+1.53	+1.47

	B→ A	B→ F
EXP	+5.62%	+ 3.22%
CON	-0.10%	+2.70%

ΔIQ on OSAIS

	B→ A	A→ F	B→ F
EXP	+2.47	+0.23	+2.70
CON	-0.70	-1.65	-2.35

	B→ A	B→ F
EXP	+4.49%	+4.91%
CON	-1.35%	-4.52%

ΔIQ on DAM

	B→ A	A→ F	B→ F
EXP	+9.13*	-0.93	+8.20*
CON	+1.94	+2.41	+4.35*

	B→ A	B→ F
EXP	+11.26%	+10.11%
CON	+2.46%	+5.53%

ΔMA on OSAIS

	B→ A	A→ F	B→ F	
EXP	+8.4*	+2.4	+10.8*	*
CON	+0.52	-3.0	-2.48	

	B→ A	B→ F
EXP	+10.19%	+13.11%
CON	+0.36%	-3.25%

ΔMA on DAM

Table 5. Summary of Increases in IQ and MA on OSAIS and DAM Tests for Experimental and Control Groups

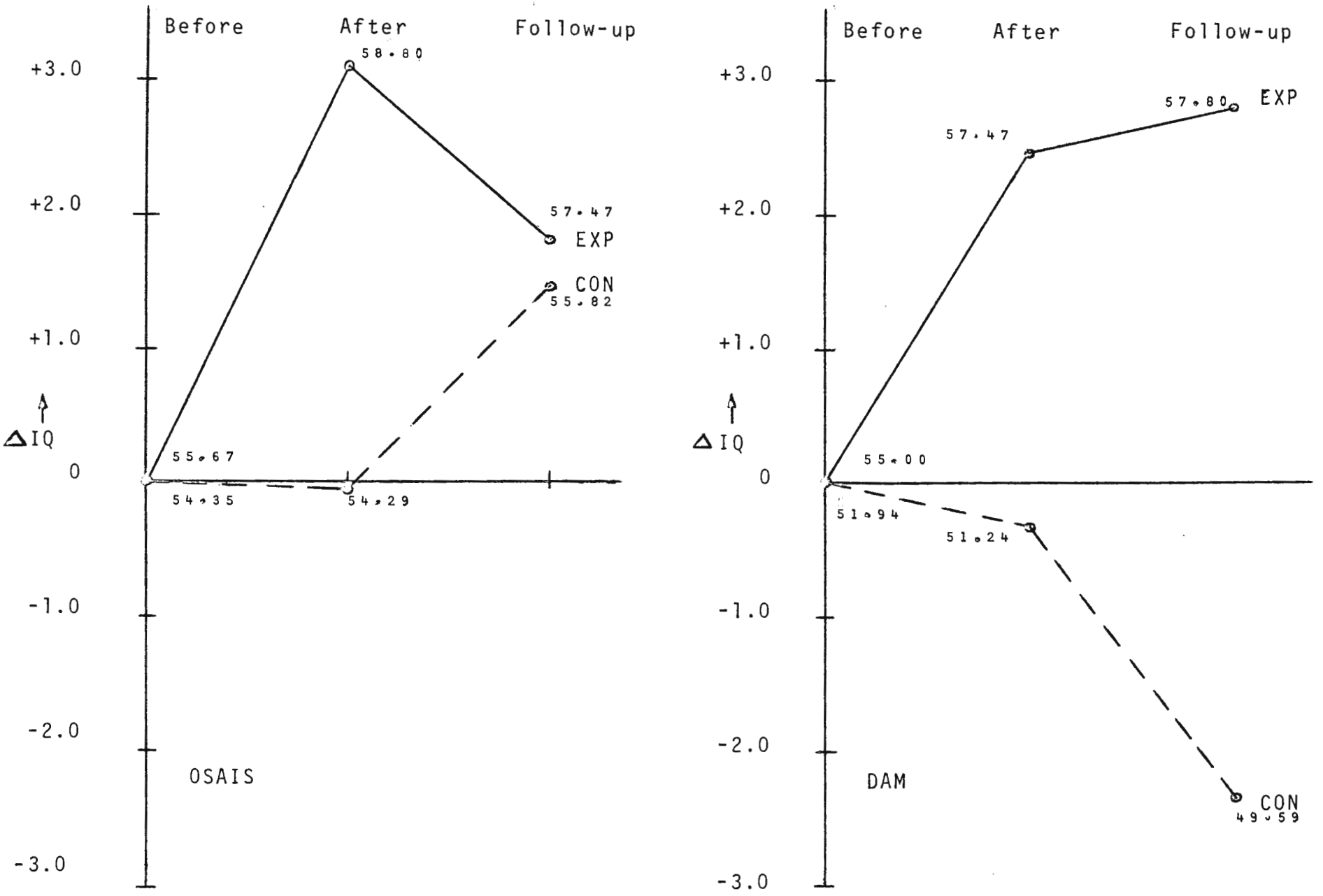
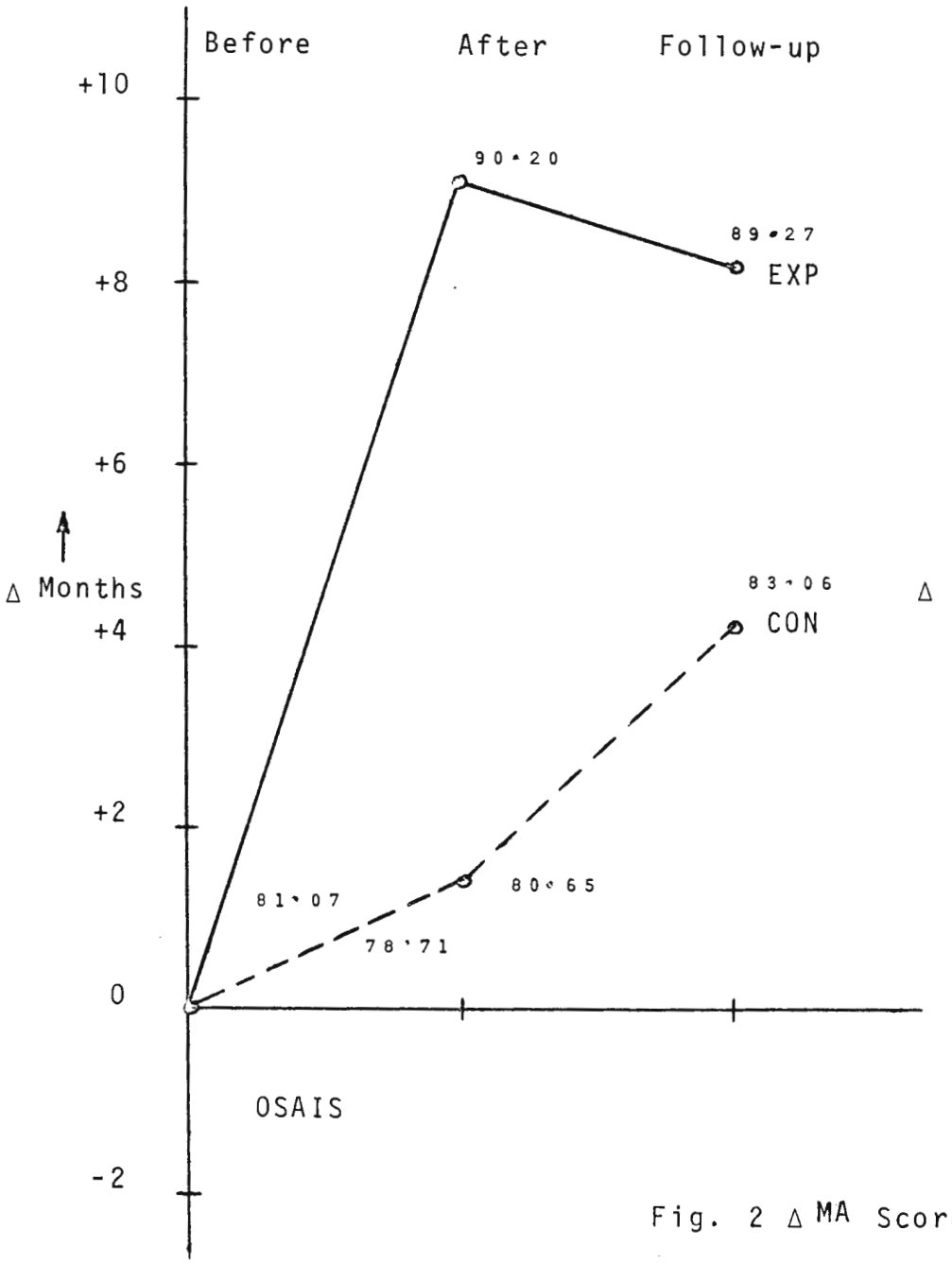


Fig. 1 ΔIQ Scores on OSAIS and DAM Tests



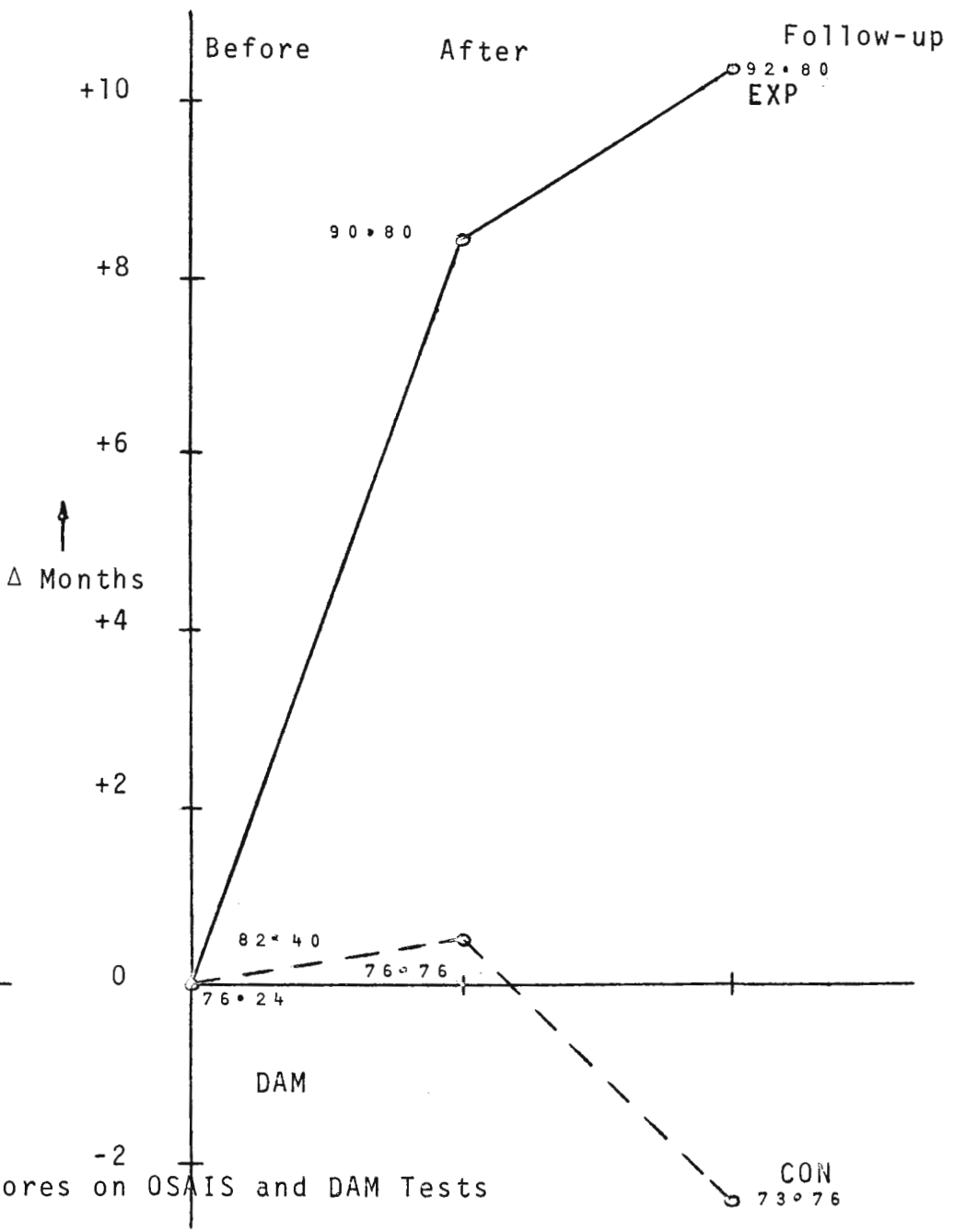


Fig. 2 Δ MA Scores on OSAIS and DAM Tests

The four sets of results are described below.

4.1.1 Comparison of IQ scores on OSAIS test

No significant interaction effects were found. (Table 6). However, because the trend in the E-group scores was as expected, it was thought interesting to examine the mean IQ values of the groups at the different test periods (refer Fig. 1 and Table 5).

The mean IQ score of the E-group rose from 55.67 by 3.13 points (+5.62%) in the B-A period, and then decreased by 1.34 points in A-F period, giving a net B-F increase of 1.79 points (+3.22%). For the C-group, the mean IQ score remained substantially unchanged from 54.35 in the B-A period, but then increased by 1.53 points in the A-F period resulting in a B-F net increase of 1.47 points (+2.70%).

4.1.2 Comparison of IQ scores on DAM test

No significant interaction effects were found (Table 7), but as in the OSAIS test, the trends were found to be relevant (refer Fig. 1 and Table 5).

The mean IQ of the E-group rose from 55.00 by 2.47 points (+4.49%) in the B-A period, and then rose slightly by another 0.23 points in the A-F period so that the final B-F increase was 2.70 points (+4.91%). With the C-group, however, there was a small constant decrease in mean IQ, by 0.7 points from an initial mean of 51.94 (-1.35%), in the B-A period, and then by a further 1.65 points in the A-L period resulting in an overall B-L decrease of 2.35 points (-4.52%).

	Before	After	Follow-up
EXP	55.667	58.800	57.467
	9.294	10.517	10.134
CONTROL	54.353	54.294	55.824
	9.585	7.679	10.020

Means and Standard Deviations

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	147.982	1	147.982	0.586
Subjects W.G.	7571.12	30	252.371	
Within subjects				
B (Testings)	53.665	2	26.832	2.499
Subjects W.G.	48.995	2	24.498	2.282
B x SWG	644.187	60	10.737	

ANOVA Summary

Table 6. Means, SD and ANOVA Summary of IQ Scores on OSAIS Tests

	Before	After	Follow-up
EXP	55.000	57.467	57.801
	10.447	11.237	11.546
CONTROL	51.941	51.235	49.588
	11.025	9.378	10.278

Means and Standard Deviations

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	813.622	1	813.622	2.750
Subjects W.G.	8876.69	30	295.892	
Within subjects				
B (Testings)	13.323	2	6.661	0.301
AB	107.640	2	53.820	2.432
B x SWG	1327.56	60	22.126	

ANOVA Summary

Table 7. Means, SD and ANOVA Summary of IQ Scores on DAM Tests

4.1.3 Comparison of MA scores on OSAIS tests

The mean MA of the E-group rose in the B-A period by 9.13 months from an initial value of 81.07 months (+11.26%), and only dropped by 0.93 months in the A-F period, the net B-F increase being 8.20 months (+10.11%). With the C-group, the corresponding increase in the B-A period was 1.94 months from an initial mean value of 78.71 months (+2.46%), with a further increase in the A-F period of 2.41 months, final net B-F increase being 4.35 months (+5.53%).

The ANOVA results (Table 8) revealed a significant interaction effect ($F_{2,60}=6.065$, $p<0.01$) as well as significant differences over the testing periods ($F_{2,60}=22.053$, $P<0.01$). Analysis of Simple Main Effects (see Table 9) showed significant differences in both the E-group and C-group scores over the testing periods ($F_{2,80}=22.274$, $p<0.01$ and $F_{2,80}=4.751$, $p<0.05$ respectively).

Pairwise comparisons (Table 9) of the E-group scores indicated that the significant differences occured in the B-A period (Tukey $HSD_{3,60}=8.577$, $p<0.01$) and that this significance was maintained over the complete B-F period (Tukey $HSD_{3,60}=7.701$, $p<0.01$). Pairwise comparison of the C-group scores indicated that the significant differences only occurred in the B-F period (Tukey $HSD_{3,60}=4.352$, $p<0.01$).

4.1.4 Comparison of MA scores on DAM tests

The mean MA of the E-group rose from an initial value of 82.4 months (+10.19%) in the B-A period, and by a further

2.4 months in the A-F period, resulting in a net B-L increase of 10.8 months (+13.11%). With the C-group, there was a small increase in the B-A period by 0.52 months from an initial mean of 76.24 months (+0.36%), but a drease of 3.0 months in the following A-F period, the net B-F decrease being 2.48 months (-3.25%) (refer Fig. 2 and Table 5).

The ANOVA results (Table 10) showed up a significant interaction effect ($F_{2,60}$=3.841, $p<0.05$). The Simple Main Effects calculation (Table 11) indicated a significant difference between the groups at the follow-up testing period ($F_{1,90}$= 6.483, $p<0.05$) and also significant differences within E-group scores over the test periods ($F_{2,80}$=5.231, $p<0.01$). Pairwise comparisons (Table 11) of the E-group showed the significance to be over the B-A period (Tukey $HSD_{3,60}$=7.89, $p<0.01$) and that this significance was further increased over the complete B-L period (Tukey $HSD_{3,60}$=9.77, $p<0.01$).

	Before	After	Follow-up
EXP	81.067 16.761	90.200 16.845	89.267 16.892
CONTROL	78.706 18.947	80.647 16.328	83.059 16.142

Means and Standard Deviations

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	872.329	1	872.329	1.044
Subjects W.G.	25058.0	30	835.267	
Within subjects				
B (Testings)	750.183	2	375.092	22.053**
AB	206.316	2	103.158	6.065 **
B x SWG	1020.50	60	17.008	

** $p<0.01$

ANOVA Summary

Table 8. Means, SD and ANOVA Summary of MA Scores on OSAIS Tests

Source	SS	DF	MS	F Ratio
A at B 1	44.406	1	44.406	0.153
A at B 2	727.187	1	727.187	2.510
A at B 3	307.094	1	307.094	1.060
W Cell	26078.8	90	289.761	
B at A 1	757.687	2	378.844	22.274**
B at A 2	161.625	2	80.813	4.751*
B x SWG	1360.66	80	17.008	

* p<0.05
** p<0.01

Simple Main Effects

	TUKEY HSD DF = 3,60			SCHEFFE F DF = 2,60
	B1 : B2	B1 : B3	B2 : B3	B1: B2+B3
A1	8.577**	7.701**	0.876	22.081**
A2	1.941	4.352**	2.411	3.299*

* p<0.05
** p<0.01

Pairwise Comparisons

Table 9. Simple Main Effects and Pairwise Comparisons of MA Scores on OSAIS Tests

	Before	After	Follow-up
EXP	82.400	90.800	92.800
	22.446	22.889	21.197
CONTROL	76.235	76.765	73.765
	23.142	19.958	16.705

Means and Standard Deviations

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	4089.09	1	4089.090	3.520
Subject W.G.	34846.2	30	1161.540	
Within subjects				
B (Testings)	381.628	2	190.814	2.185
AB	670.869	2	335.435	3.841 *
B x SWG	5239.25	60	87.321	

* $p<0.05$

ANOVA Summary

Table 10. Means, SD and ANOVA Summary of MA Scores on DAM Tests

Source	SS	DF	MS	F Ratio
A at B 1	302.844	1	302.844	0.680
A at B 2	1569.72	1	1569.72	3.524
A at B 3	2887.37	1	2887.37	6.483*
W Cell	40085.4	90	445.394	
B at A 1	913.625	2	456.812	5.231*
B at A 2	87.125	2	43.563	0.499
B x SWG	6985.66	80	87.321	

* $p<0.05$

Simple Main Effects

	TUKEY HSD DF = 3,60			SCHEFFE F DF = 2,60
	B1 : B2	B1 : B3	B2 : B3	B1: B2+B3
A1	7.889**	9.767**	1.878	25.976**

** $p<0.01$

Pairwise Comparisons

Table 11. Simple Main Effects and Pairwise Comparisons of MA Scores on DAM Tests

4.1.5 Pearson Correlation Test

In order to detect possible correlations between a number of the factors involved in the study, a Pearson Correlation test was carried out on the following variables associated with each subject (Table A17):

1 Chronological age
2 Mental age
3 Period of institutionalisation
4 ΔIQ on the OSAIS in the B-A period
5 ΔMA on the OSAIS in the B-A period

The correlations were performed for both the E-group and C-group, and generated the results shown in Tables 12 and 13.

4.1.6 Chi Square Test

Chi Square tests were performed in order to determine whether there were any significant differences in the distribution of the two groups with respect to classification, chronological age, socio-economic background or period of institutionalisation of the subjects (Table 16). In all cases $p > 0.10$ implying that at the chosen levels of significance, no significant differences existed.

2-way ANOVA tests, with factor A the two groups and factor B the male and female categories, were also run to determine the possible effects of the sexes of the subjects on the changes in IQ and MA. No significant interaction effects were found for either $_{\Delta}$IQ or $_{\Delta}$MA (Tables 14 and 15), from which it can be

concluded that the performance of the boys and girls in both groups were not significantly different.

With these ANOVA tests, as in fact with all ANOVA calculations performed in this study, checks were made on homogeneity of error terms to ensure non-significance. In all cases the assumption of non-significant differences was found to be valid.

Variable	Mean	Std. Dev.
1	156.733	32.466
2	81.067	16.761
3	51.533	37.557
4	3.133	3.314
5	8.467	4.406

Correlation Matrix				
Variable 1 1.000				
Variable 2 0.576	1.000			
Variable 3 0.087	0.053	1.000		
Variable 4 - 0.643	-0.385	-0.152	1.000	
Variable 5 - 0.371	-0.191	-0.216	0.798	1.000

Scale 12. Pearson Correlations of Chronological Age, MA, Length in Institution, ΔIQ and ΔMA of Experimental Group

Variable	Mean	Std. Dev.
1	153.941	33.898
2	78.706	18.947
3	46.529	40.432
4	- 0.059	4.322
5	1.941	5.984

Correlation Matrix				
Variable 1 1.000				
Variable 2 0.653	1.000			
Variable 3 0.562	0.046	1.000		
Variable 4 - 0.172	-0.613	0.148	1.000	
Variable 5 - 0.166	-0.565	0.171	0.976	1.000

Scale 13. Pearson Correlations of Chronological Age, MA, Length in Institution, ΔIQ and $_{\Delta}$MA of Control Group

	Female	Male
EXP	4.750 2.500	2.545 3.475
CONTROL	-0.714 5.024	0.400 3.978

Means and Standard Deviations

Source	SS	DF	MS	F Ratio
A (Groups)	99.198	1	99.198	6.410 *
B (Sex)	2.036	1	2.036	0.132
AB	18.868	1	18.868	1.219
Within	433.306	28	15.475	

* $p < 0.05$

ANOVA Summary

Table 14. 2x2 (Groups x Sex) ANOVA for ΔIQ on OSAIS Test

	Female	Male
EXP	8.000 3.559	8.636 4.822
CONTROL	1.000 6.110	2.600 6.132

Means and Standard Deviations

Source	SS	DF	MS	F Ratio
A (Groups)	291.122	1	291.122	9.786**
B (Sex)	8.567	1	8.567	0.288
AB	1.591	1	1.591	0.053
Within	832.945	28	29.748	

** $p<0.01$

ANOVA Summary

Table 15. 2x2 (Groups x Sex) ANOVA for ΔMA on OSAIS Test

Variables	EXP	CON	CHI SQUARE
Classifications - Case History			
Feebleminded	5	6	
Feebleminded with brain damage	3	4	
Feebleminded with epilepsy	1	1	
Subnormal-culturally deprived	3	2	
Familial	1	2	
Downs Syndrome	2	1	
Brain damaged with epilepsy	0	1	
Classifications - 1973 AAMD Definition			
Borderline	1	1	
Mild	8 } 9	6 } 7	1.129*
Moderate	6	9	d.f.=1
Severe	0 } 6	1 } 10	
Chronological Age			
Under 12 years	5	9	1.245*
Over 12 years	10	8	d.f.=1
Length in Institution			
Under 4 years	7	10	0.437*
Over 4 years	8	7	d.f.=1
Sex			
Boys	11	10	0.744*
Girls	4	7	d.f.=1
Socio-economic Background			
Low	10	14	
Middle	2	3	1.046*
Upper	3 } 5	0 } 3	d.f.=1

* $p>0.10$

Table 16. Distribution of Experimental and Control Groups with respect to Classification, Chronological Age, Length in Institution, Sex and Socio-Economic Background

4.2 Social Behaviour Rating Scale

Social behaviour was rated on seven different aspects:

1. General Behaviour
2. Interaction
3. Confidence
4. Attention Span
5. Co-operation
6. Interest
7. Understanding

Values attained by the subjects in these behaviours were assessed by the experimenter and teachers at each of the three testing periods according to the devised Rating Scale (see Tests and Tables A6 to A12).

4.2.1 Ratings of Social Behaviour

Because of the subjective nature of the scoring of the behaviours, it was first necessary to assess the degree of similarity between the experimenter's and teacher's scores before using the values obtained. Therefore Pearson correlations were performed on the 42 sets of scores obtained (7 behaviours x 3 testing periods x 2 groups). The corresponding means, standard deviations and correlation factors were used in t-tests for dependent samples.

The results of these calculations are presented in Table 17 from which it can be seen that correlation factors in the range 0.772 to 1.000 were obtained. The null hypothesis was accepted for all comparisons, with $p>0.1$ in all cases except for the 'After' score of the E-group in the 'Confidence' level, for which $0.1>p>0.05$.

	Before		After		Follow-up	
	Correl Factor	t	Correl Factor	t	Correl Factor	t
1 General Behaviour	0.772	-0.323	0.839	-0.564	0.897	0.000
2 Interaction	0.890	-1.001	0.802	-1.470	0.802	-1.470
3 Confidence	0.970	-0.994	0.868	-1.871	0.868	-1.871
4 Co-operation	0.931	0.562	1.000	0.000	1.000	0.000
5 Attention Span	0.968	-1.003	0.978	1.000	0.978	1.000
6 Interest	1.000	0.000	1.000	0.000	1.000	0.000
7 Under-standing	1.000	0.000	0.947	1.004	0.947	1.004

	Before		After		Follow-up	
	Correl Factor	t	Correl Factor	t	Correl Factor	t
1 General Behaviour	0.852	0.566	0.873	1.461	0.873	1.461
2 Interaction	0.954	0.032	0.921	-0.998	0.921	-0.998
3 Confidence	0.968	-1.000	0.868	-1.000	0.868	-1.000
4 Co-operation	0.903	0.999	0.900	0.436	0.900	0.436
5 Attention Span	0.981	-1.009	0.945	1.454	0.974	0.998
6 Interest	0.900	-1.001	1.000	0.000	1.000	0.000
7 Under-standing	1.000	0.000	1.000	0.000	1.000	0.000

Table 17. Pearson Correlation Factors and t-values for Inter-Experimenter Reliability Test on Social Behaviour Scores

A 2-way Analysis of Variance for Repeated Measurements with factor A the two groups, and factor B the three testing periods, was performed to compare the results obtained by the experimental and control groups on each level of behaviour. When the interaction effect F_{AB} was found to be significant, Simple Main Effects were calculated to determine the cause/s, and Pairwise Comparisons performed to further analyse the results where necessary.

The results obtained on these tests indicate that there were significant interaction effects at all levels of behaviour except for 'Interest', with p 0.01 in all significant cases except for 'Understanding' where p 0.05.

These results are discussed in more detail below.

4.2.1.1 General Behaviour

The ANOVA summary (Table 18) indicated a significant interaction effect ($F_{2,60}=9.133$, $p<0.01$) as well as significant variation over the testing periods ($F_{2,60}=16.633$, $p<0.01$). Simple Main Effects (Table 19) showed the groups to be significantly different at the 'Before' and 'After' periods ($F_{1,90}=6.242$, $p<0.05$ and $F_{1,90}=3.239$, $p<0.05$) but not at the 'Follow-up' period; also significant within -group variations of the E-group ($F_{2,80}=23.725$, $p<0.01$). From Pairwise Comparisons (Table 19) it was found that the significant increase was in the B-A period and that it was maintained in the B-F period (Tukey $HSD_{3,60}=8.536$, $p<0.01$ and TUKEY $HSD_{3,60}=8.333$, $p<0.01$).

	Before	After	Follow-up
EXP	3.100	4.500	4.467
	1.105	0.707	0.812
CONTROL	3.794	4.000	4.000
	0.751	0.637	0.637

Means and Standard Deviation

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	0.197	1	0.197	0.190
Subjects W.G.	31.154	30	1.038	
Within subjects				
B (Testings)	13.422	2	6.711	16.333**
AB	7.369	2	3.685	9.133**
B x SWG	24.208	60	0.403	

** $p<0.01$

ANOVA Summary

Table 18. Means, SD and ANOVA Summary of General Behaviour Scores on Social Behaviour Rating Scale

Source	SS	DF	MS	F Ratio
A at B 1	3.839	1	3.839	6.242*
A at B 2	1.992	1	1.992	3.239*
A at B 3	1.735	1	1.735	2.821
W Cell	55.363	90	0.615	
B at A 1	19.144	2	9.572	23.714**
B at A 2	0.480	2	0.240	0.595
B x SWG	32.278	80	0.403	

** $p<0.01$

Simple Main Effects

	TUKEY HSD DF = 3,60			SCHEFFE F DF = 2,60
	B1 : B2	B1 : B3	B2 : B3	B1: $\overline{B2+B3}$
A1	8.536 **	8.333 **	0.203	23.714 **

** $p<0.01$

Pairwise Comparisons

Table 19. Simple Main Effects and Pairwise Comparisons of General Behaviour Scores on Social Behaviour Rating Scale

4.2.1.2 Interaction

The ANOVA summary (Table 20) indicated a significant interaction effect ($F_{2,60}$=21.580, $p<0.01$) as well as significant variation over the testing periods ($F_{2,60}$=21.580, $p<0.01$). Simple Main Effects (Table 21) showed the groups to be significantly different at all three testing periods ($F_{1,90}$=4.734, $p<0.05$; $F_{1,90}$=6.279, $p<0.05$; $F_{1,90}$=6.279, $p<0.05$) and also significant within -group variation in the E-group ($F_{2,80}$=58.322, $p<0.01$). Pairwise comparisons (Table 21) show that this significant increase is over the B-A period, and remains the same over the B-F period (TUKEY $HSD_{3,60}$=13.228, $p<0.01$).

4.2.1.3 Confidence

The ANOVA summary (Table 22) showed a significant interaction effect ($F_{2,60}$=10.997, $p<0.01$) as well as significant between- and within- group variations ($F_{1,30}$=4.733, $p<0.05$ and $F_{2,60}$=21.191, $p<0.01$ respectively). Simple Main Effects (Table 23) pointed to the between-group differences being significant at the 'After' and 'Follow-up' periods($F_{1,90}$=9.266, $p<0.01$ in both cases) and the within-group variation to be that of the E-group ($F_{2,80}$=29.514, $p<0.01$). Subsequent analysis (Table 23) showed that these significant increases of the E-group occurred over the B-A period, as well as the B-F period (TUKEY $HSD_{3,60}$=9.410, $p<0.01$ in both cases).

	Before	After	Follow-up
EXP	2.467 1.060	4.600 0.870	4.600 0.870
CONTROL	3.294 1.146	3.647 1.196	3.647 1.196

Means and Standard Deviation

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	3.089	1	3.089	1.154
Subjects W.G.	80.317	30	2.677	
Within subjects				
B (Testings)	32.839	2	16.420	42.083**
AB	16.840	2	8.420	21.580**
B x SWG	23.410	60	0.390	

** $p<0.01$

ANOVA Summary

Table 20. Means, SD and ANOVA Summary of Interaction Scores on Social Behaviour Rating Scale

Source	SS	DF	MS	F Ratio
A at B 1	5.456	1	5.456	4.734*
A at B 2	7.236	1	7.236	6.279*
A at B 3	7.236	1	7.236	6.279*
W Cell	103.727	90	1.153	
B at A 1	45.511	2	22.756	58.322**
B at A 2	1.411	2	0.706	1.809
B x SWG	31.214	80	0.390	

* $p<0.05$
** $p<0.01$

Simple Main Effects

	TUKEY HSD DF = 3,60			SCHEFFE F DF = 2,60
	B1 : B2	B1 : B3	B2 : B3	B1: $\overline{B2+B3}$
A1	13.228 **	13.228 **	0	58.322 **

** $p<0.01$

Pairwise Comparisons

Table 21. Simple Main Effects and Pairwise Comparisons of Interaction Scores on Social Behaviour Rating Scale

	Before	After	Follow-up
EXP	2.967	4.233	4.233
	1.043	0.753	0.753
CONTROL	3.088	3.294	3.294
	0.939	0.849	0.849

Means and Standard Deviation

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	8.199	1	8.199	4.733*
Subjects W.G.	51.968	30	1.732	
Within subjects				
B (Testings)	11.520	2	5.760	21.191**
AB	5.978	2	2.989	10.997**
B x SWG	16.308	60	0.278	

* $p<0.05$
** $p<0.01$

ANOVA Summary

Table 22. Means, SD and ANOVA Summary of Confidence Scores on Social Behaviour Rating Scale

Source	SS	DF	MS	F Ratio
A at B 1	0.118	1	0.118	0.155
A at B 2	7.029	1	7.029	9.266**
A at B 3	7.029	1	7.029	9.266**
W Cell	68.277	90	0.759	
B at A 1	16.044	2	8.022	29.514**
B at A 2	0.480	2	0.240	0.884
B x SWG	21.473	80	0.272	

** $p < 0.01$

Simple Main Effects

	TUKEY HSD DF = 3,60			SCHEFFE F DF = 2,60
	B1 : B2	B1 : B3	B2 : B3	B1: $\overline{B2+B3}$
A1	9.410**	9.410**	0	29.514**

** $p < 0.01$

Pairwise Comparisons

Table 23. Simple Main Effects and Pairwise Comparisons of Confidence Scores on Social Behaviour Rating Scale

4.2.1.4 Attention Span

ANOVA calculations (Table 24) showed significant interaction effects ($F_{2,60}$=12.560, $p<0.01$) between-group variations ($F_{1,30}$=12.342, $p<0.01$), and within-group variations ($F_{2,60}$=12.068, $p<0.01$). The between-group variations were found to occur at the 'After' and 'Follow-up' periods ($F_{1,90}$=17.388, $p<0.01$ and $F_{1,90}$=19.164, $p<0.01$ respectively) (Table 25), while the within-group variations over the testing periods were caused by the E-group ($F_{2,80}$=23.114, $p<0.01$), the latter occurring in the B-A and B-F ranges (TUKEY $HSD_{3,60}$=8.327, $p<0.01$) (Table 25).

4.2.1.5 Co-operation

Results of ANOVA calculations (Table 26) indicated significant within-group ($F_{2,60}$=26.679, $p<0.01$) and interaction ($F_{2,60}$=13.680, $p<0.01$) effects. The groups were found to be significantly different (Table 27) at the 'After' and 'Follow-up' periods ($F_{1,90}$=4.815, $p<0.05$ in both cases), while the E-group showed significant variations over the testing periods ($F_{2,80}$=36.973, $p<0.01$). These occured in the B-A and B-F periods (TUKEY $HSD_{3,60}$= 10.532, $p<0.01$) (Table 27).

4.2.1.6 Interest

The ANOVA calculations revealed that there was no significant interaction effect (Table 28).

	Before	After	Follow-up
EXP	3.833 1.484	5.300 1.222	5.300 1.222
CONTROL	3.500 1.199	3.529 0.992	3.441 1.059

Means and Standard Deviation

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	41.712	1	41.712	12.342 **
Subject W.G.	101.39	30	3.380	
Within subjects				
B (Testings)	11.231	2	5.616	12.068 **
AB	11.688	2	5.844	12.560 **
B x SWG	27.920	60	0.465	

** $p < 0.01$

ANOVA Summary

Table 24. Means, SD and ANOVA Summary of Attention Span Scores on Social Behaviour Rating Scale

Source	SS	DF	MS	F Ratio
A at B 1	0.885	1	0.885	0.616
A at B 2	24.981	1	24.982	17.388**
A at B 3	27.534	1	27.534	19.164**
W Cell	129.309	90	1.437	
B at A 1	21.511	2	10.756	23.114**
B at A 2	0.068	2	0.034	0.074
B x SWG	37.226	80	0.465	

** $p<0.01$

Simple Main Effects

	TUKEY HSD DF = 3,60			SCHEFFE F DF = 2,60
	B1 : B2	B1 : B3	B2 : B3	B1: $\overline{B1+B2}$
A1	8.327**	8.327**	0	23.114**

** $p<0.01$

Pairwise Comparisons

Table 25. Simple Main Effects and Pairwise Comparisons of Attention Span Scores on Social Behaviour Rating Scale

	Before	After	Follow-up
EXP	3.067	4.667	4.667
	1.237	0.976	0.976
CONTROL	3.529	3.794	3.794
	1.068	1.213	1.213

Means and Standard Deviation

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	4.368	1	4.368	1.415
Subject W.G.	92.622	30	3.087	
Within subjects				
B (Testings)	18.473	2	9.236	26.679 **
AB	9.472	2	4.736	13.680 **
B x SWG	20.772	60	0.346	

** $p<0.01$

ANOVA Summary

Table 26. Means, SD and ANOVA Summary of Co-operation Scores on Social Behaviour Rating Scale

Source	SS	DF	MS	F Ratio
A at B 1	1.706	1	1.706	1.354
A at B 2	6.067	1	6.067	4.815*
A at B 3	6.067	1	6.067	4.815*
W Cell	113.394	90	1.260	
B at A 1	25.600	2	12.800	36.973**
B at A 2	0.794	2	0.397	1.147
B x SWG	27.696	80	0.346	

* $p<0.05$
** $p<0.01$

Simple Main Effects

	TUKEY HSD DF = 3,60			SCHEFFE F DF = 2,60
	B1 : B2	B1 : B3	B2 : B3	B1: $\overline{B2+B3}$
A1	10.532 **	10.532 **	0	36.973 **

** $p<0.01$

Pairwise Comparisons

Table 27. Simple Main Effects and Pairwise Comparison of Co-operation Scores on Social Behaviour Rating Scale

	Before	After	Follow-up
EXP	2.333	2.933	2.933
	0.617	0.799	0.799
CONTROL	2.029	2.176	2.176
	0.514	0.636	0.636

Means and Standard Deviation

Source	SS	DF	MS	F Ratio
Between subjects				
A (groups)	8.776	1	8.776	9.384 **
Subject W.G.	28.055	30	0.935	
Within subjects				
B (Testings)	2.965	2	1.482	7.219 **
AB	1.089	2	0.545	2.654
B x SWG	12.321	60	0.205	

** $p<0.01$

ANOVA Summary

Table 28. Means, SD and ANOVA Summary of Interest Scores on Social Behaviour Rating Scale

4.2.1.7 Understanding

ANOVA calculations (Table 29) showed the presence of significant within-group and interaction effects ($F_{2,60}$=19.007, $p<0.01$ and $F_{2,60}$=3.170, $p<0.05$ respectively). Simple Main Effect results (Table 30) indicated significant variations over the testing periods in both the E- and C-groups ($F_{2,80}$=17.740, $p<0.01$ and $F_{2,80}$=3.549, $p<0.05$ respectively) Pairwise Comparisons (Table 30) revealed that the significant E-group changes were over the B-A and B-F periods (TUKEY $HSD_{3,60}$= 7.295, $p<0.05$ in both cases), as were the significant C-group changes (TUKEY $HSD_{3,60}$=3.463, $p<0.05$).

	Before	After	Follow-up
EXP	2.533 1.060	3.233 0.776	3.233 0.776
CONTROL	2.824 1.131	3.118 0.928	3.118 0.928

Means and Standard Deviation

Source	SS	DF	MS	F Ratio
Between subjects				
A (Groups)	0.009	1	0.009	0.004
Subjects W.G.	72.314	30	2.410	
Within subjects				
B (Testings)	5.250	2	2.625	19.007**
AB	0.875	2	0.438	3.170*
B x SWG	8.286	60	0.138	

* $p<0.05$
** $p<0.01$

ANOVA Summary

Table 29. Means, SD and ANOVA Summary of Understanding Scores on Social Behaviour Rating Scale

Source	SS	DF	MS	F Ratio
A at B 1	0.671	1	0.671	0.749
A at B 2	0.107	1	0.107	0.119
A at B 3	0.107	1	0.107	0.119
W Cell	80.600	90	0.896	
B at A 1	4.900	2	2.450	17.740**
B at A 2	0.980	2	0.490	3.549 *
B x SWG	11.049	80	0.138	

* $p<0.05$
** $p<0.01$

Simple Main Effects

	TUKEY HSD DF = 3,60			SCHEFFE F DF = 2,60
	B1 : B2	B1 : B3	B2 : B3	B1: $\overline{B2+B3}$
A1	7.295 **	7.295 **	0	17.740 **
A2	3.463*	3.263*	0	3.549*

* $p<0.05$
** $p<0.01$

Pairwise Comparisons

Table 30. Simple Main Effects and Pairwise Comparisons of Understanding Scores on Social Behaviour and Rating Scale

5. DISCUSSION

DISCUSSION

Mental subnormality exists in various degrees of severity and seems to be the outcome of an interaction between organic and environmental factors. Although the complex interactions which ensue developmentally between individual capacity and the environment are far from being adequately understood, the earlier belief that mental retardation is essentially an unchangeable condition is no longer tenable - an impressive array of hard data leaves no doubt that measured intellectual ability can be increased.

The impairment of mental subnormality is most obvious in the mastery of a new situation, especially where the learning involves dealing with abstractions or symbolic materials. Mentally subnormal persons tend to be predisposed to a greater amount of failure and may thus be more susceptible to social and emotional problems. Their inability to meet the expectations of their social environment may be more important determinants of their behaviour than is the original cause of their subnormality, especially in the institutional setting.

Institutionalisation itself is generally acknowledged as contributing to progressive intellectual retardation, largely due to environmental inadequacy. The institutionalised mentally retarded child is thus severely hampered in his progress towards intellectual maturity.

However, modern theories of general intelligence

provide evidence that intelligence is not fixed and can be improved by the introduction of suitably stimulating environments. Enrichment programs which draw on the theories of social learning have been developed to expose the children to socially rewarding situations in order to increase their adaptability to normal conditions. That the increased self-confidence gained from such socially stimulating programs would indirectly result in an increase in intellectual performance, has been hypothesised and shown to be true for normal institutionalised children exposed to the DUSO Guidance Program (Bagg, 1973).

The present study has concentrated on extending the previously obtained results to the realm of mentally retarded children. In particular, it was hypothesised that the mean group scores for MA, IQ and social behaviour would be increased.

The results obtained showed that:

(i) there were significant within-group increases in MA for the Experimental group on the OSAIS and DAM tests;

(ii) there was no significant increase in IQ by either the Experimental or Control Groups on the OSAIS and DAM tests;

(iii) there were significant between-group differences on five of the seven sub-tests of behaviour; significant within-group differences on six of the sub-tests for the Experimental group and one of the sub-tests for the Control group.

Examining the results more closely, it can be seen that there were no significant differences in IQ between the E- and C-groups at the three testing periods on both the OSAIS and DAM tests respectively. Within-group variations on both tests were also not statistically significant.

These small IQ increases imply that MA must have increased at approximately the same rate as chronological age, thus rendering it difficult to determine the effect of the DUSO program on the intellectual development of the children (this is particularly true in the case of retardates where only small IQ increases can be expected). It was for this reason that all statistical calculations were carried out for MA as well as for IQ.

The average MA of the E-group on the OSAIS test increased significantly by 9.13 months after the DUSO program, and two months later it was found that there had only been an average decrease of 0.93 months, giving an overall significant increase of 8.20 months. During the same time the mean MA value of the C-group rose by 2.41 months in the 'Before' to 'After' testing period and interestingly, continued rising to attain an overall significant increase of 4.35 months. At none of the testing periods was there a significant difference between the two groups for this test.

The significant within-group improvement in MA by the E-group on the OSAIS test (which was maintained, despite a small decrease in the two month 'Follow-up' period) can confidently be attributed to the administering of the DUSO program. This would appear to indicate

that continuation of the DUSO program is required - possibly not as intensely as administered in the present study - to maintain the improvement in MA over a long term. In fact, at the termination of the program, it was decided by the teachers to incorporate some aspects of it into the cirriculum of the special school within the institution.

A possible cause of the significant overall improvement by the C-group on the OSAIS was the stimulation and novelty of both exposure to the experimenter and the structured program given to the C-group; as well as the subsequent introduction of fresh ideas by the teachers into the school curriculum at termination of the DUSO program.

Thus although no significant between-group differences were found, the results add further weight to the argument that intelligence is not fixed and can be favourably modified by the intervention of an enrichment program such as DUSO, particularly in an institutional setting.

A visual indication of the scores obtained by the experimental and control groups on the various items of the OSAIS test, are given by the histograms in Figs. 3 and 4. These histograms indicate the 'Before' and 'After' scores obtained by the groups on each item of the OSAIS test up to number 49, the 'After' score being shown as an increase or decrease relative to the 'Before' value. (Items higher than 49 were not included on the histogram as no child scored correctly in the 50-55 item range. A copy of the OSAIS test is included in Appendix 11 so that the corresponding questions to the items on the histogram, can be found).

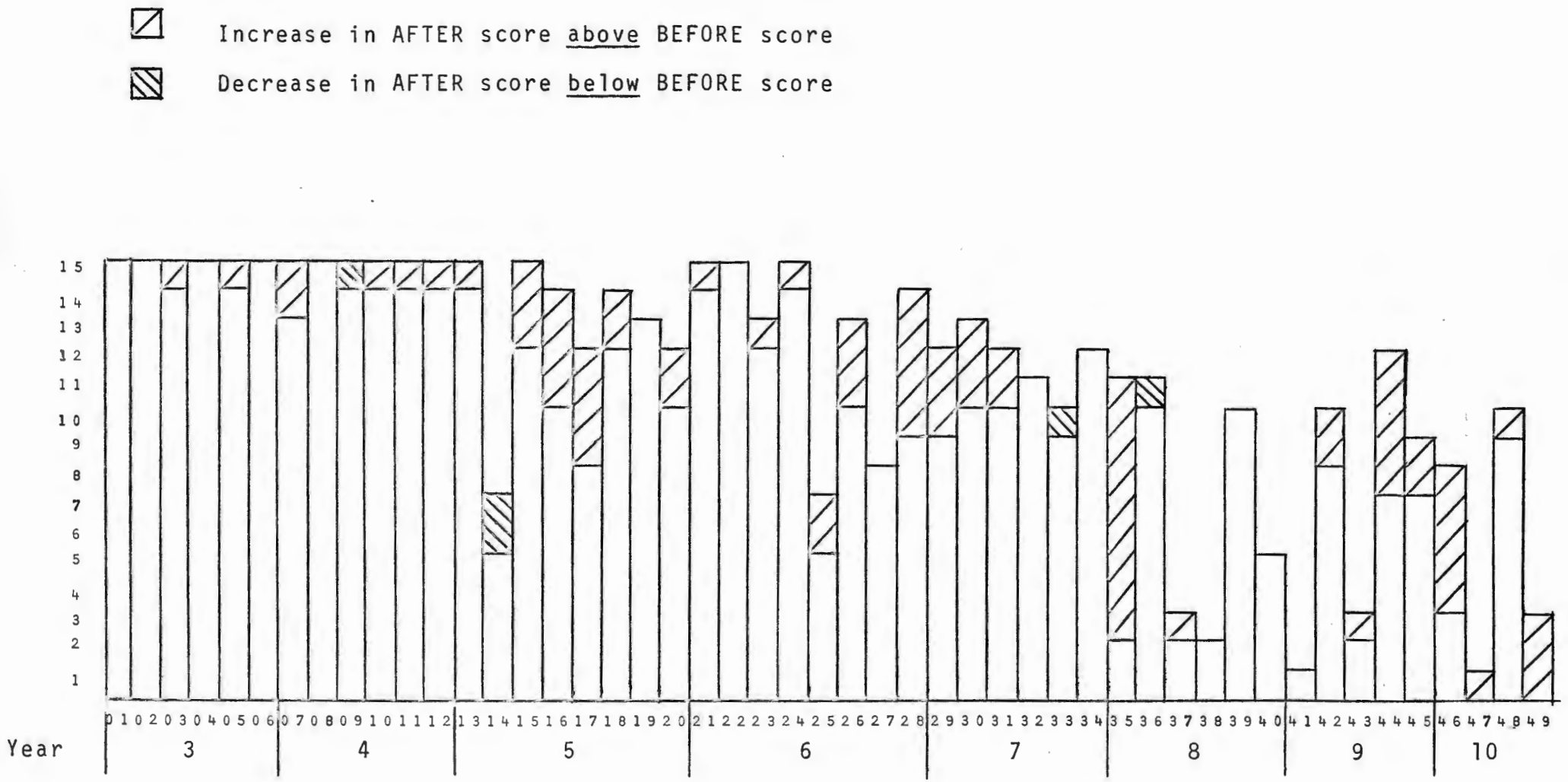


Fig. 3. Item Analysis Histogram of OSAIS for Experimental Group

Key:

Increase in AFTER score above BEFORE score

Decrease in AFTER score below BEFORE score

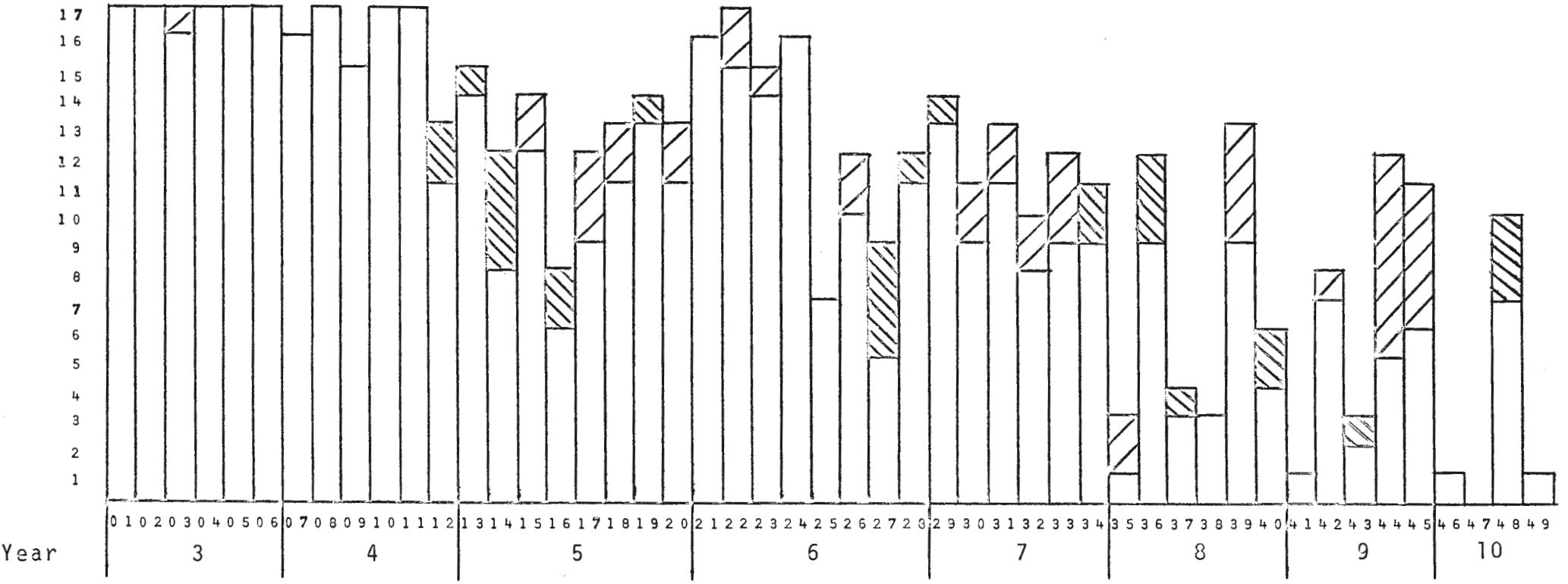


Fig. 4. Item Analysis Histogram on OSAIS for Control Group

These histograms illustrate clearly - in visual terms - the overall improvement in performance of the E-group after the DUSO program. Because of the different numbers of subjects in the two groups, relative changes in performance between the groups cannot be equated directly. However, the striking improvement on item 35 by the experimental group stands out. This item is of particular interest because it relates to social behaviour, indicating heightened social awareness and responsibility which could have generalised from the DUSO program.

The histograms thus provide a useful insight as to which scores on the OSAIS are affected by this program.

Examining the results of the DAM test, it was found that the average MA of the E-group had increased significantly by 8.4 months when measured after cessation of the DUSO program, and continued rising to reach an increase of 10.8 months when tested two months later. The mean MA of the C-group remained substantially constant over the 'Before' to 'After' period, but then dropped to a level of -2.84 months. Although this decrease was not significant, when paired with the above-mentioned non-significant increase in MA of the E-group, it brought about the only significant difference between groups in all the IQ and MA results. Whether this between-group significance would be maintained or was as a result of favourable statistical sampling, would require even further follow-up studies to ascertain.

As previously discussed, results on the DAM test can be seen as a reasonable indication of the maturity of interpersonal relationships - children encountering difficulties with the latter have been found to obtain

low scores on tests which involve the human figure (Brill, 1937).

The significant within-group increases of the E-group on the DAM can be attributed to the administering of the DUSO program, and in particular, to its improving the interpersonal behaviour or interaction of the children (as is noted later, significant between-group differences on the 'Interaction' sub-test of the Social Behaviour Rating Scale were found).

There were no significant increases in the C-group scores over the same period, which might be expected as the structured program did not stress social behaviour concepts as inherent in the DUSO program.

Most work with intelligence tests has centered on the comparison of scores which have been earned by brain-damaged children on verbal as opposed to performance tasks. In general, brain-damaged children have been expected to do poorly on performance items, since these are heavily weighted with perceptual-motor skills. Generally speaking, the expectation of lower scores on performance scales has been confirmed on a number of tests, including Wechsler test and tests for Primary Mental Abilities, the Hunt Minnesota Test for Organic Brain Damage, and others (Avakian, 1961; Baroff, 1959; Beck and Lam, 1955; Cassel and Danenhower, 1949; Guertin et al, 1962). Nevertheless, there is some evidence that when the brain-damaged subjects are limited exclusively to those who have no motor defects, the differences between verbal and performance IQ's may disappear (Newman and Loos, 1951).

As previously mentioned, the DAM is a performance IQ

test whereas the OSAIS is more heavily biased toward measuring verbal ability. Whereas the subjects in this study were not all brain damaged, none of them had motor defects so that the results of this study, which found no significant differences between verbal and performance scores, lead to a similar conclusion as that put forward by Newman and Loos (1951). This also corroborates a previous investigation (Gersholowitz and Schrire, 1974) in which it was found that verbal and non-verbal abilities are evenly distributed in institutionalised mentally retarded children.

When planning this study it was not possible to match the groups exactly on a number of variables, which may have affected the results; however, the Chi Square tests that were performed revealed no significant differences in the group composition on the values tested (classification, chronological age, socio-economic background and period of institutionalisation). Sex did not prove to be an important variable in the investigation as no differences in performance on the OSAIS were found when the subjects were divided by sex.

An interesting result which emerged from a Pearson Correlation test was that a moderate negative correlation factor (-0.643) between chronological age and increase on IQ on OSAIS was observed for the E-group. It was not unexpected that younger children should show superior results to older children on this test, for following the work of Taylor (1971) on his mental age growth curve, it is predicted that intelligence increases more slowly with maturation. In this connection, it is of interest that the retardate's mental age growth period may actually be shorter than

that of the normal: in one series of Down's Syndrome individuals, little increase in mental age was found after age 10 (Cornwell and Birch, 1969).

Studies reporting gains in IQ as a result of increased stimulation have been criticised from many quarters. Some have questioned the real importance of gains of 10 or 15 IQ points when the person is still markedly below average intellectual ability. These critics may have a point since an IQ in itself offers very little from which to make a prediction. Other critics impressed with the fact that there appear to be limits in the extent to which IQ gains can be attained, have suggested that intellectual ability itself is not changed by the early training. They explain the apparent gain as accruing from the child's acquisition of other habits and skills (attending, remembering, wanting to please) which enable him to make maximum effective use of his potential.

Clarizio and McCoy (1970) hope that the critics have correctly analysed the problem and that the chief influence of early education is made by instilling more efficient personality traits and social skills. If so, this opens a potent possibility for dealing with mental retardates since the adjustment failures of the mentally retarded appear to be more related to deficits in personality and social skills than in intellectual skills.

Whilst the primary motivation for this study was to determine whether an intellectual improvement would accrue when using the DUSO program with institutionalised mentally retarded children, the importance of

growth in social awareness was recognised and so, as a secondary consideration, it was decided to monitor the social behaviour of the subjects during the experiment as well. To this end, the Social Behaviour Rating Scale was prepared on seven different dimensions of behaviour.

The choice of behaviour for this scale was based upon selecting those behaviours which, due to the nature of the DUSO program, might be expected to be favourably affected. Because of the nature of this study and the diverse areas of subnormality of the children, the decision was made to use broad definitions of the behaviours chosen, and to assess the children in terms of degree (for example, 6= very good) of each particular behaviour.

However, in selecting the units by which each behaviour was to be rated, a clash between reliability and validity was faced. Theoretically one can obtain a high degree of reliability by using small and easily observed and recorded units. Thus one can attempt to define behaviour quite operationally by listing a large number of behavioural acts, and thus can attain a high degree of precision and reliability. Yet in so doing, one may also have so reduced the behaviour that it no longer bears much resemblance to the behaviour one intended to observe. Thus validity has been lost.

On the other hand, one can use broad "natural" definitions and perhaps achieve a high degree of validity. Admittedly a broad even vague definition allows considerable ambiguity of interpretation to creep into observers' perceptions, thus lowering reliability, but it does enable the observer to capture the full

flavour of the behaviour observed (Kerlinger, 1965).

The subjects were scored on this scale at the same times that the IQ tests were given. The results obtained are summarised in Table 31, from which it can be seen that of the seven aspects tested, namely, General Behaviour; Interaction; Confidence; Co-operation; Attention Span; Interest and Understanding, at only the Interest sub-level was no significant interaction affect found. With all the others there were significant within-group increases for the E-group at both the 'After' and 'Follow-up' testing periods. The only within-group significance found for the C-group was at the 'After' and 'Follow-up' periods for Understanding (not indicated in Table 31). This ties in with the fact that between-group significances were only found for the remaining five sub-tests having significant interaction effects, these significances being at the 'After' and - with the exception of General Behaviour - the 'Follow-up' periods.

Of course it is realised that with the arbitrary and non-standardised manner in which the Rating Scales were set-up, significances do not necessarily have much relevance per se. However, these striking statistical results were backed up by personal observation and teachers' reports on a marked improvement in the social behaviour and conduct of the children.

This then most definitely indicates a need for further more accurate observations of social behaviour on a standardised scale. In particular, it would be interesting to see how the subjects in the different groups rated on a scale such as the Vineland

	ANOVA R.M.	SIMPLE MAIN EFFECTS			PAIRWISE COMPARISONS	
	F_{AB}	A at B1	A at B2	A at B3	B at A1	
					B1:B2	B1:B3 B2:B3
1 General Behaviour	**	*	*		**	**
2 Interaction	**	*	*	*	**	**
3 Confidence	**		**	**	**	**
4 Co-operation	**		*	*	**	**
5 Attention Span	**		**	**	**	**
6 Interest						
7 Understanding	*				**	**

* $p<0.05$
** $p<0.01$

Table 31. Summary of Significances found in Results for Social Behaviour Rating Scale

Maturity Scale (Doll, 1953, 1965) before and after a similar administering of the DUSO program.

These findings, in which social behaviour appears to have benefitted more visibly than intellectual development, substantiates the findings of others in the field. Thus, for example, after a lifetime of work with retardates Penrose (1963) concluded that: "the most important work carried out in the field of training defectives is unspectacular. It is not highly technical but requires unlimited patience, goodwill and common sense. The reward is to be expected not so much in scholastic improvement of the patient as in his personal adjustment to social life. Occupations are found for patients of all grades so that they can take part as fully and usefully as possible in human affairs. This process which has been termed socialisation, contributes greatly to the happiness not only of the patients themselves, but also to those who are responsible for their care".

Zigler (1970) finds himself in general agreement that it is within this area of socialisation that we can do a great deal to enhance the every day effectiveness of the retarded. Given his genetic orientation (in both the biological and developmental sense), he concurs that it is difficult to alter intellectual structures per se.

It is of more than passing interest, however, that both Burks (1939) and Leahy (1935) discovered that personality and character traits were more influenced by environment than was intellectual level. Dinkmeyer then shows that if the environment can be manipulated so as to imbue a sense of heightened self-concept into

the child, this will in turn lead to intellectual development. In other words, the feelings which accompany learning have a significant effect on its results. If a child has positive feelings, he tends to be motivated toward the task, participates with a high degree of involvement, and is more likely to derive permanent gains from his efforts. Conversely, if his feelings are negative, he is poorly motivated, participates on a minimal basis, and is less likely to derive permanent gains from his efforts.

Of particular relevance to this study is that this process is equally valid for the mental retardates, whose intellectual development varies with self-concept in a similar manner to that of normal children. For as Baroff states: "Retarded individuals, like the rest of us, share needs for survival, structure, self-esteem and self-expression. While the disability of mental retardation does not affect basic needs qualitatively, it does influence their relative intensity and the likelihood of their being met" (Hardy and Cull, 1974).

In terms of experimental design, this study has a number of methodological limitations which should be taken into account when discussing the results: The total sample size in this study was perhaps too small to accurately assess the full effect of the program. This size was imposed by the limited number of educable retardates available at the institution; however, in any future research the use of the program simultaneously in a few institutions for mentally retarded children if necessary, would provide a greater sample size and hence lead to greater confidence in the validity of the results obtained. An added advantage

would be that if the numbers were large enough, it might be possible to show any differences that may exist between children of varying degrees of mental retardation.

The use of large sample sizes also facilitates the matching of subjects in control and experimental groups, thus overcoming a difficulty encountered in this study. Matching could be attempted, not only on the variables mentioned in this study, but also on such factors as sibling order; age of separation from family; and amount of prior schooling.

Another variable of relevance is the time for which the program is administered. The DUSO program does not specify the length of time for presentation of the various cycles, and so this must be chosen by the teacher or experimenter. Perhaps a longer experimental period would have given different results.

What should also be kept in mind is that there is sufficient material in the DUSO Guidance Program to be used throughout an entire school year for normal children. Comprehension of this material requires a progressively deeper and more subtle awareness of the social implications put over so that, because of the nature of the subjects in this study, only the first 20% of the material was used. This was an arbitrary choice and although it was subsequently found to be suitable on average for the group, it was noted that towards the end of the two month period some children were already out of their depth, while others were longing for new stories.

This would seem to suggest that the composition of

the sub-groups could have been improved so that children of similar abilities would have been grouped together. The splitting of the E-group into the three sub-groups was originally done on the basis of keeping children from the same school class together - the rationale for this being that the school classes were already composed of children of approximately the same educable standard. In future studies, however, it would most probably be more beneficial not to have a permanent sub-group composition, nor to present the same material in each sub-group. Instead, to allow children to selectively filter between the sub-group based on their ability to cope with the different material being used in the different sub-groups.

In this way the children could then progress at their own rate, the brighter ones not being impeded in their development by the slower ones. This technique of advancement by ability rather than pre-defined curricula is now frequently used in modern schools for normal children.

Apart from the abovementioned methodological considerations, an experimenter bias similar to that suggested by Schwartz and Flannigan (1970) may have been present in the current research, since the tester was aware during the test situation of the group to which each subject belonged. In future designs this could be eliminated by having the testing done by an unaware third person.

In the realm of the statistical techniques used, there are also limitations which are frequently overlooked. With many calculations in common use there is the assumption that the two population variables be

normally distributed. Departures from this assumption often have only minor consequences on the result, or can be corrected for; however, in the case of the Pearson Correlation test, for example, if the variables are not close to being normally distributed, the tests are of highly questionable validity (Lordahl, 1967).

Despite these shortcomings, it is felt that the results obtained at least give an indication of the trends which are to be expected in any future research with the DUSO program on institutionalised mentally retarded children.

6. CONCLUSION

The administration of the DUSO Guidance Program to institutionalised mentally retarded children was a fruitful and encouraging study, despite the lack of statistical validity of all the hypotheses.

The latter indicated that IQ did not increase significantly; the hypothesis with regard to mental age was only partially confirmed; while the hypothesis regarding social behaviour was accepted.

These results should be seen in the light of social learning theory, in which the same principles of learning apply regardless of a child's retardation, so that establishing this degree in terms of test scores becomes a very secondary matter. In other words, the lack of significant statistical results for gains in IQ and mental age should not invalidate the results of this study, especially as the statistical trends observed were in the correct directions and were accompanied by clearly observed improvements in the childrens' behaviour.

Consequently it can be concluded that the use of the DUSO program with institutionalised mentally retarded children in order to improve their social and intellectual behaviour, promises an interesting line of research for the future.

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APPENDIX 1

TABLES OF RESULTS

	EXPERIMENTAL	
Subject	Case History	1973 AAMD
1	Feebleminded	Moderate
2	Feebleminded	Mild
3	Feebleminded	Mild
4	Subnormal - culturally deprived	(Borderline)
5	Feebleminded with brain damage	Moderate
6	Subnormal - culturally deprived	Mild
7	Feebleminded	Mild
8	Feebleminded	Moderate
9	Familial	Mild
10	Feebleminded with brain damage	Moderate
11	Downs Syndrome	Moderate
12	Feebleminded with epilepsy	Mild
13	Feebleminded with brain damage	Mild
14	Downs Syndrome	Moderate
15	Subnormal - culturally deprived	Mild

Table A1. Case History and 1973 AAMD Classifications of Mental Retardation

CONTROL		
Subject	Case History	1973 AAMD
1	Feebleminded with epilepsy	Mild
2	Feebleminded	Mild
3	Feebleminded	Mild
4	Feebleminded	Moderate
5	Feebleminded	Moderate
6	Feebleminded with brain damage	Moderate
7	Familial	Moderate
8	Feebleminded with brain damage	Moderate
9	Feebleminded	Moderate
10	Feebleminded	Moderate
11	Feebleminded with brain damage	Mild
12	Feebleminded with brain damage	(Borderline)
13	Brain damage with epilepsy	Moderate
14	Subnormal - culturally deprived	Mild
15	Downs Syndrome	Severe
16	Subnormal - culturally deprived	Moderate
17	Familial	Mild

Subject	Sex	Chronological Age	Length in Institution	Age entered Institution
1	M	16y 9m	4y 7m	12y 2m
2	M	15y 9m	5y 11m	9y 10m
3	M	15y 5m	2m	15y 3m
4	M	11y 1m	2y 7m	8y 6m
5	M	15y 0m	1y 7m	13y 5m
6	M	14y 3m	4y 2m	10y 1m
7	M	11y 3m	5y 2m	6y 1m
8	M	15y 3m	2y 0m	13y 3m
9	M	15y 8m	12y 1m	3y 7m
10	M	10y 1m	7y 9m	2y 4m
11	M	12y 4m	7y 2m	5y 2m
*	F	16y 7m	5y 8m	10y 11m
12	F	12y 4m	2y 2m	10y 2m
13	F	13y 3m	2y 2m	11y 1m
*	F	5y 10m	7m	5y 3m
14	F	10y 4m	5y 8m	4y 8m
15	F	7y 2m	1y 3m	5y 11m
*	F	7y 6m	5y 2m	2y 4m

* Dropped out before completion of program

Table A2. Chronological Age, Sex, Length in Institution, and Age entered Institution of Experimental Group

Subject	Sex	Chronological Age	Length in Institution	Age entered Institution
1	M	14y 7m	2y 9m	11y 10m
2	M	15y 8m	7m	15y 1m
3	M	11y 10m	2y 9m	9y 1m
4	M	16y 4m	11y 5m	4y 11m
5	M	16y 1m	8y 4m	7y 9m
6	M	16y 1m	8y 5m	7y 8m
*	M	15y 0m	9y 0m	6y 0m
7	M	11y 2m	1y 4m	9y 10m
8	M	15y 7m	8y 2m	7y 5m
9	M	11y 7m	2y 6m	9y 1m
10	M	10y 6m	4y 2m	6y 4m
11	F	15y 9m	6m	15y 3m
12	F	10y 2m	9m	9y 5m
13	F	13y 11m	3y 0m	10y 11m
14	F	7y 6m	3m	7y 3m
15	F	11y 3m	5y 5m	5y 10m
16	F	10y 11m	4y 3m	6y 8m
17	F	9y 2m	1y 4m	7y 10m

* Dropped out before completion of program

Table A3. Chronological Age, Sex, Length in Institution, and Age entered Institution of Control Group

	OSAIS			DAM		
Subject	Before	After	Follow -up	Before	After	Follow -up
1	39	42	42	17	21	20
2	43	49	47	34	35	35
3	39	44	44	15	21	19
4	41	45	45	15	19	19
5	24	30	30	15	14	17
6	43	43	43	18	27	30
7	34	41	41	22	23	26
8	27	30	26	15	16	15
9	40	41	41	11	13	17
10	22	31	31	9	11	12
11	21	24	26	12	12	12
12	31	35	37	16	17	18
13	36	43	41	16	19	17
14	18	22	23	6	6	7
15	21	29	24	4	9	8

Table A4. Raw Scores of Experimental Group on OSAIS and DAM Tests

	OSAIS			DAM		
Subject	Before	After	Follow -up	Before	After	Follow up
1	36	36	37	21	24	20
2	46	42	42	23	21	21
3	39	38	39	25	17	15
4	42	43	43	19	18	20
5	33	36	37	11	8	9
6	31	30	28	13	18	14
7	22	26	27	11	9	8
8	34	36	39	12	18	19
9	20	26	26	5	6	6
10	24	31	32	17	15	16
11	44	46	47	23	20	14
12	39	35	36	10	8	13
13	33	33	33	7	5	6
14	16	22	32	5	8	12
15	9	12	12	8	16	7
16	24	24	31	8	7	8
17	26	23	21	5	7	4

Table A5. Raw Scores of Control Group on OSAIS and DAM Tests

	EXP			CONTROL		
Subject	Before	After	Follow -up	Before	After	Follow -up
1	2 2	4 5	4 5	4 4	5 5	5 5
2	2 4	4 4	4 4	5 4	5 4	5 4
3	4 4	5 5	5 5	4 4	4 4	4 4
4	4 2	5 5	5 5	4 4	4 4	4 4
5	2 2	5 5	5 5	5 4	4 4	4 4
6	4 4	5 5	5 5	4 4	4 4	4 4
7	4 4	5 5	5 5	4 4	4 4	4 4
8	2 2	2 3	2 2	4 5	4 4	4 4
9	4 4	5 5	5 5	2 2	5 5	5 5
10	1 2	4 4	4 4	4 4	4 4	4 4
11	4 4	5 4	5 4	4 4	4 4	4 4
12	4 4	4 4	4 4	4 4	4 4	4 4
13	4 4	5 5	5 5	4 4	2 2	2 2
14	4 4	4 4	4 4	2 2	4 3	4 3
15	1 1	5 5	5 5	4 4	4 4	4 4
16				3 3	4 4	4 4
17				4 4	4 4	4 4

Table A6. Scores of Experimental and Control Groups for General Behaviour

	EXP			CONTROL		
Subject	Before	After	Follow-up	Before	After	Follow-up
1	2 2	4 4	4 4	4 4	4 4	4 4
2	2 4	6 6	6 6	4 4	4 4	4 4
3	2 2	4 5	4 5	4 4	5 6	5 6
4	4 4	6 5	6 5	3 4	3 4	3 4
5	1 1	4 4	4 4	4 4	4 4	4 4
6	2 2	6 6	6 6	2 2	2 2	2 2
7	2 2	4 6	4 6	2 2	2 2	2 2
8	2 2	2 3	2 3	1 1	1 1	1 1
9	2 2	4 4	4 4	2 2	2 3	2 3
10	4 4	4 4	4 4	3 3	4 4	4 4
11	2 2	4 4	4 4	5 5	5 5	5 5
12	2 2	3 4	3 4	4 4	4 4	4 4
13	4 4	4 4	4 4	4 4	4 4	4 4
14	4 4	4 4	4 4	4 3	5 4	5 4
15	1 1	6 6	6 6	3 3	3 3	3 3
16				2 2	4 4	4 4
17				5 5	5 5	5 5

Table A7. Scores of Experimental and Control Groups for Interaction

	EXP			CONTROL		
Subject	Before	After	Follow up	Before	After	Follow -up
1	4 4	5 5	5 5	4 4	4 4	4 4
2	4 4	5 5	5 5	4 4	4 4	4 4
3	2 2	3 3	3 3	4 4	4 4	4 4
4	3 3	5 5	5 5	2 2	2 2	2 2
5	2 2	5 5	5 5	4 4	4 4	4 4
6	3 3	5 5	5 5	4 4	4 4	4 4
7	2 2	4 5	4 5	2 2	2 2	2 2
8	3 4	3 4	3 4	2 2	2 2	2 2
9	4 4	4 4	4 4	2 2	2 3	2 3
10	4 4	4 4	4 4	2 2	2 3	2 3
11	4 4	4 4	4 4	4 4	4 4	4 4
12	2 2	3 4	3 4	2 3	2 3	2 3
13	2 2	3 3	3 3	4 4	4 4	4 4
14	4 4	4 4	4 4	2 2	4 3	4 3
15	1 1	5 5	5 5	4 4	4 4	4 4
16				3 3	4 4	4 4
17				3 3	3 3	3 3

Table A8. Scores of Experimental and Control Groups for Confidence

	EXP			CONTROL		
Subject	Before	After	Follow -up	Before	After	Follow -up
1	4 4	6 6	6 6	4 4	4 4	4 4
2	6 6	6 6	6 6	4 4	4 4	4 4
3	6 6	6 6	6 6	4 4	4 4	4 4
4	4 4	6 6	6 6	4 4	4 4	4 4
5	2 3	6 6	6 6	5 5	4 4	4 4
6	4 4	6 6	6 6	5 5	5 5	5 5
7	4 4	6 6	6 6	4 4	4 4	4 4
8	4 4	4 4	4 4	4 4	4 4	4 4
9	4 4	6 5	6 5	4 4	4 3	2 2
10	2 2	6 6	6 6	4 4	4 4	4 4
11	1 1	2 2	2 2	5 5	5 5	5 5
12	6 6	4 4	4 4	2 2	2 2	2 2
13	4 4	6 6	6 6	2 3	2 2	2 2
14	4 4	6 6	6 6	1 1	4 3	4 3
15	2 2	4 4	4 4	2 2	2 2	2 2
16				3 3	3 3	3 3
17				2 2	2 2	2 2

Table A9. Scores of Experimental and Control Groups for Attention Span

	EXP			CONTROL		
Subject	Before	After	Follow -up	Before	After	Follow -up
1	2 2	4 4	4 4	4 4	4 4	4 4
2	2 3	4 4	4 4	4 4	4 4	4 4
3	4 4	6 6	6 6	4 4	4 4	4 4
4	2 2	6 6	6 6	4 4	4 4	4 4
5	2 2	4 4	4 4	4 4	4 4	4 4
6	4 4	6 6	6 6	4 4	4 4	4 4
7	4 4	6 6	6 6	4 4	4 4	4 4
8	6 6	6 6	6 6	4 2	4 2	4 2
9	2 2	4 4	4 4	2 2	1 1	1 1
10	2 2	4 4	4 4	4 4	6 6	6 6
11	2 2	4 4	4 4	6 6	6 6	6 6
12	4 3	4 4	4 4	2 2	4 4	4 4
13	4 4	4 4	4 4	4 4	4 4	4 4
14	4 4	4 4	4 4	2 2	4 4	4 4
15	2 2	4 4	4 4	4 4	2 3	2 3
16				3 3	4 4	4 4
17				2 2	2 2	2 2

Table A10. Scores of Experimental and Control Groups for Co-operation

	EXP			CONTROL		
Subject	Before	After	Follow-up	Before	After	Follow-up
1	3 3	4 4	4 4	2 2	2 2	2 2
2	3 3	5 5	5 5	2 2	2 2	2 2
3	2 2	3 3	3 3	2 2	2 2	2 2
4	2 2	3 3	3 3	2 2	3 3	3 3
5	2 2	3 3	3 3	2 3	2 2	2 2
6	2 2	3 3	3 3	3 3	3 3	3 3
7	2 2	3 3	3 3	1 1	2 2	2 2
8	2 2	2 2	2 2	2 2	2 2	2 2
9	2 2	3 3	3 3	2 2	1 1	1 1
10	3 3	3 3	3 3	2 2	3 3	3 3
11	3 3	2 2	2 2	3 3	3 3	3 3
12	3 3	2 2	2 2	2 2	2 2	2 2
13	2 2	3 3	3 3	2 2	2 2	2 2
14	3 3	2 2	2 2	2 2	3 3	3 3
15	1 1	3 3	3 3	2 2	2 2	2 2
16				2 2	2 2	2 2
17				1 1	1 1	1 1

Table A11. Scores of Experimental and Control Groups for Interest

	EXP			CONTROL		
Subject	Before	After	Follow-up	Before	After	Follow-up
1	3 3	4 4	4 4	3 3	3 3	3 3
2	4 4	4 4	4 4	4 4	4 4	4 4
3	4 4	4 4	4 4	3 3	3 3	3 3
4	3 3	4 4	4 4	4 4	4 4	4 4
5	3 3	4 4	4 4	2 2	3 3	3 3
6	3 3	4 4	4 4	3 3	3 3	3 3
7	2 2	3 3	3 3	2 2	3 3	3 3
8	1 1	2 2	2 2	3 3	2 2	2 2
9	3 3	3 3	3 3	3 3	4 4	4 4
10	3 3	4 3	4 3	4 4	4 4	4 4
11	1 1	2 2	2 2	4 4	4 4	4 4
12	3 3	3 3	3 3	2 2	2 2	2 2
13	3 3	3 3	3 3	4 4	4 4	4 4
14	1 1	2 2	2 2	4 4	4 4	4 4
15	1 1	3 3	3 3	1 1	2 2	2 2
16				1 1	3 3	3 3
17				1 1	1 1	1 1

Table A12. Scores of Experimental and Control Groups for Understanding

Subject	O S A I S IQ			D A M IQ		
	Before	After	Follow-up	Before	After	Follow-up
1	49	52	51	46	51	48
2	58	62	60	76	76	76
3	55	58	57	48	54	50
4	74	77	77	63	68	68
5	42	44	43	50	45	49
6	64	62	61	57	70	74
7	64	70	70	76	75	79
8	43	43	38	49	47	45
9	55	53	53	40	41	47
10	52	62	61	52	55	57
11	47	48	49	53	51	51
12	57	59	61	61	60	61
13	60	65	63	57	60	56
14	47	51	52	45	45	46
15	68	76	66	52	64	60

Table A13. IQ Scores of Experimental Group on OSAIS and DAM Tests

Subject	O S A I S IQ			D A M IQ		
	Before	After	Follow-up	Before	After	Follow-up
1	55	54	54	61	65	57
2	62	56	56	59	55	55
3	69	65	66	79	62	58
4	54	54	54	50	47	50
5	45	47	47	38	32	33
6	43	41	38	41	50	41
7	50	53	54	54	50	47
8	48	48	51	42	49	51
9	48	53	53	42	43	43
10	54	61	62	69	63	65
11	59	60	60	59	52	41
12	76	68	69	54	49	60
13	54	53	53	40	36	37
14	57	63	79	53	60	71
15	36	40	40	48	63	45
16	53	52	61	49	46	48
17	61	55	52	45	49	41

Table A14. IQ Scores of Control Group on OSAIS and DAM Tests

Subject	OSAIS Mental Age			DAM Mental Age		
	Before	After	Follow-up	Before	After	Follow-up
1	7y 10m	8 5m	8y 5m	7y 6m	8y 6m	8y 0m
2	8y 7m	9y 8m	9y 4m	11y 9m	12y 9m	11y 9m
3	7y 10m	8y 10m	8y 10m	6y 6m	8y 6m	7y 9m
4	8y 2m	9y 0m	9y 0m	6y 6m	8y 0m	7y 9m
5	5y 6m	6y 4m	6y 4m	7y 0m	6y 6m	7y 3m
6	8y 7m	8y 7m	8y 7m	8y 0m	10y 0m	10y 6m
7	7y 0m	8y 2m	8y 2m	9y 0m	9y 3m	9y 6m
8	5y 10m	6y 4m	5y 9m	7y 0m	7y 3m	6y 9m
9	8y 0m	8y 3m	8y 3m	5y 9m	6y 3m	7y 3m
10	5y 3m	6y 6m	6y 6m	5y 3m	5y 9m	6y 0m
11	5y 1m	5y 6m	5y 9m	6y 0m	6y 0m	6y 0m
12	6y 6m	7y 2m	7y 6m	7y 3m	7y 6m	7y 6m
13	7y 4m	8y 7m	8y 3m	7y 0m	7y 6m	7y 3m
14	4y 9m	5y 3m	5y 5m	4y 6m	4y 6m	4y 9m
15	5y 1m	6y 2m	5y 6m	4y 0m	6y 0m	8y 0m

Table A15. MA Scores of Experimental Group on OSAIS and DAM Tests

Subject	OSAIS Mental Age			DAM Mental Age		
	Before	After	Follow-up	Before	After	Follow-up
1	7y 4m	7y 4m	7y 6m	8y 6m	9y 3m	8y 0m
2	9y 2m	8y 5m	8y 5m	9y 3m	8y 3m	8y 3m
3	7y 10m	7y 8m	7y 10m	9y 6m	7y 3m	6y 9m
4	8y 5m	8y 7m	8y 7m	8y 3m	7y 6m	8y 0m
5	6y 10m	7y 4m	7y 6m	6y 3m	5y 0m	5y 3m
6	6y 6m	6y 4m	6y 0m	6y 3m	8y 0m	6y 6m
7	5y 3m	5y 9m	5y 10m	5y 9m	5y 3m	5y 0m
8	7y 0m	7y 4m	7y 10m	6y 0m	7y 9m	7y 9m
9	5y 0m	5y 9m	5y 9m	4y 3m	4y 6m	4y 6m
10	5y 6m	6y 6m	6y 8m	7y 3m	6y 9m	7y 0m
11	8y 9m	9y 2m	9y 4m	9y 0m	8y 3m	6y 6m
12	7y 10m	7y 2m	7y 4m	5y 9m	4y 9m	6y 9m
13	6y 10m	6y 10m	6y 10m	4y 9m	4y 3m	4y 6m
14	4y 6m	5y 3m	6y 8m	4y 0m	5y 0m	6y 0m
15	3y 6m	4y 0m	4y 0m	4y 0m	7y 6m	4y 9m
16	5y 6m	5y 6m	6y 6m	5y 0m	4y 9m	5y 0m
17	5y 9m	5y 4m	5y 1m	4y 3m	4y 9m	4y 0m

Table A16. MA Scores of Control Group on OSAIS and DAM Tests

Subject	Sex	Chron. Age (months)	Mental Age (months)	Length in Instit. (months)	ΔIQ (OSAIS) (A-B)	ΔMA (OSAIS) (A-B)
1	M	201	94	55	3	7
2	M	189	103	71	4	13
3	M	185	94	2	3	12
4	M	133	98	31	3	10
5	M	180	66	19	2	10
6	M	171	103	50	-2	0
7	M	135	84	62	6	14
8	M	183	70	24	0	6
9	M	188	96	145	-2	3
10	M	121	63	93	10	15
11	M	148	61	86	1	5
12	F	148	78	26	2	8
13	F	159	88	26	5	5
14	F	124	57	68	4	6
15	F	86	61	15	8	13

Experimental group

Subject	Sex	Chron. Age (months)	Mental Age (months)	Length in Instit. (months)	ΔIQ (OSAIS) (A-B)	ΔMA (OSAIS) (A-B)
1	M	175	88	33	-1	0
2	M	188	110	7	-6	-9
3	M	142	94	33	-4	-2
4	M	196	101	137	0	2
5	M	193	82	100	2	6
6	M	193	78	101	-2	-2
7	M	134	63	16	3	6
8	M	187	84	98	0	4
9	M	139	60	30	5	9
10	M	126	66	50	7	12
11	F	189	105	6	1	5
12	F	122	94	9	-8	-8
13	F	167	82	36	-1	0
14	F	90	54	3	6	9
15	F	135	42	65	4	6
16	F	131	66	51	-1	0
17	F	110	69	16	-6	-5

Control group

Table A17. Sex, Chronological Age, Mental Age, Length in Institution, ΔIQ and ΔMA of Experimental and Control Groups

Subjects (EXP)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL B	TOTAL A
1	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	15	15
2	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	15	15
3	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	14	15
4	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	15	15
5	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	14	15
6	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	15	15
7	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	13	15
8	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	15	15
9	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	15	14
10	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	14	15
11	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	14	15
12	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	14	15
13	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	14	15
14			✓✓	✓			✓	✓		✓	✓✓	✓	✓✓	✓		7	5
15	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	12	15
16	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓	✓✓	✓		✓✓	✓	✓✓	✓✓	10	14
17	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓			✓✓		✓	9	12
18	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓	✓✓	✓✓	✓✓		✓✓	12	14
19	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓		✓✓	13	13
20	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓		✓✓		✓✓	✓	✓✓	✓✓	✓	10	12
21	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	14	15
22	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	15	15
23	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓		✓✓	✓✓		✓✓	12	13
24	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	15	14

Table A18. Item Analysis on OSAIS for Experimental Group (Items 1-24)

Subjects (EXP)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL B	TOTAL A
25	✓✓	✓✓	✓✓	✓✓		✓✓		✓	✓							5	7
26	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓		✓✓	✓		✓✓	10	13
27	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	✓	✓✓				✓			3	3
28	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓		✓✓	✓✓	✓✓	✓	✓✓	✓	✓	9	14
29	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓		✓✓	✓		✓	✓✓	✓	✓✓	9	12
30	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓✓	✓✓			10	13
31	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓			✓	✓	✓	✓	10	12
32	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓	✓✓			✓✓	✓✓		✓✓	11	11
33	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	✓	✓✓		✓	✓	✓✓			10	9
34	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓			12	12
35	✓	✓	✓	✓		✓✓	✓	✓	✓✓	✓		✓	✓			2	11
36	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	✓	✓✓	✓	✓✓	✓✓	✓✓			11	10
37		✓✓		✓✓			✓									2	3
38		✓✓		✓✓												2	2
39	✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓			✓✓	✓✓			10	10
40	✓	✓✓	✓✓	✓		✓✓			✓✓							5	5
41		✓✓														1	1
42	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓	✓✓				✓✓			8	10
43	✓	✓	✓✓			✓										2	3
44	✓	✓✓	✓	✓✓	✓	✓✓	✓✓	✓	✓✓	✓		✓✓	✓✓			7	12
45	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓			✓			✓✓		✓	7	9
46	✓	✓	✓	✓		✓✓			✓✓			✓	✓✓			3	3
47		✓														0	1
48	✓✓	✓	✓✓	✓✓		✓✓	✓✓	✓	✓✓		✓	✓✓	✓✓			9	10
49		✓				✓							✓			0	3

Table A19. Item Analysis on OSAIS for Experimental Group (Items 25-49)

Subjects (CON)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL B	TOTAL A
1	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	17	17
2	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	17	17
3	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	16	17
4	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	17	17
5	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	17	17
6	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	17	17
7	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	16	16
8	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	17	17
9	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓		15	15
10	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	17	17
11	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	17	17
12	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓	✓		✓✓	✓✓	13	15
13	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓	✓✓	✓✓	✓✓	15	16
14	✓✓	✓✓	✓✓	✓✓	✓	✓✓			✓	✓	✓✓	✓✓	✓			✓	✓	12	8
15	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓		✓	✓✓	✓✓	✓✓	✓		✓✓	✓✓	12	14
16		✓✓		✓✓		✓		✓✓			✓✓	✓✓	✓✓	✓		✓		8	6
17	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓	✓	✓✓		✓✓	✓		✓		✓✓		9	12
18	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓	✓✓	✓	✓		✓	✓	✓	✓✓	11	13
19	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	✓✓	✓✓	✓✓			✓✓	14	13
20	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓				11	13
21	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	16	16
22	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓✓	15	17
23	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓			✓✓	✓✓	14	15
24	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	16	16

Table A20. Item Analysis on OSAIS for Control Group (Items 1-24)

Subjects (CON)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL B	TOTAL A
25	✓✓	✓✓	✓✓	✓✓			✓✓				✓✓						✓✓	7	7
26	✓	✓✓	✓✓	✓✓	✓		✓	✓✓		✓	✓✓	✓✓	✓✓			✓✓	✓✓	10	12
27	✓	✓✓	✓✓	✓✓	✓	✓		✓✓			✓✓		✓					9	5
28	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓		✓	✓✓	✓✓	✓			✓✓		12	11
29	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓		✓	✓	14	13
30	✓✓	✓✓	✓✓		✓✓	✓✓		✓✓	✓	✓	✓✓	✓	✓✓			✓		9	11
31	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓✓	✓✓	✓	✓				11	13
32		✓✓	✓✓	✓✓	✓✓	✓		✓✓			✓✓	✓✓	✓✓				✓	8	10
33	✓✓	✓✓	✓✓	✓✓		✓✓	✓	✓	✓	✓✓	✓✓	✓✓	✓				✓	9	12
34		✓✓	✓✓	✓✓	✓✓	✓✓		✓		✓✓	✓✓	✓✓	✓✓			✓	✓	11	9
35		✓✓		✓	✓													1	3
36	✓✓	✓✓	✓	✓✓	✓✓	✓		✓✓		✓	✓✓	✓✓	✓✓			✓	✓	12	9
37		✓✓	✓	✓✓							✓✓							4	3
38		✓	✓	✓✓							✓✓							3	3
39	✓✓	✓✓	✓✓	✓✓	✓✓			✓✓	✓	✓	✓✓	✓✓	✓✓	✓			✓	9	13
40			✓	✓✓				✓			✓✓	✓✓	✓✓					6	4
41											✓✓							1	1
42	✓✓	✓✓	✓✓	✓✓	✓			✓			✓✓	✓	✓✓					7	8
43		✓✓		✓							✓✓							3	2
44	✓✓	✓✓	✓	✓✓	✓		✓	✓	✓	✓	✓✓	✓✓	✓					5	12
45	✓✓	✓✓	✓✓	✓	✓			✓✓	✓	✓	✓✓	✓✓	✓					6	11
46		✓✓																1	1
47																		0	0
48	✓✓	✓	✓	✓✓	✓✓	✓✓		✓			✓✓	✓✓	✓✓					10	7
49		✓									✓							1	1

Table A21. Item Analysis on OSAIS for Control Group (Items 25-49)

APPENDIX 11

OSAIS TEST QUESTIONNAIRE

S. DURRANT & VILJOEN, PTA

5 PP

INDIVIDUAL SCALE OF THE NATIONAL BUREAU OF EDUCATIONAL RESEARCH.
INDIVIDUELE SKAAL VAN DIE NASIONALE BURO VIR OPVOEDKUNDIGE NAVORSING.

Name
Naam

Age at examination
Ouderdom by ondersoek

Date of examination
Datum van ondersoek

Examiner's signature
Handtekening van ondersoeker

School
Skool

Mental age
Verstandsouderdom

I.Q.
I.K.

Other tests (specify)
Ander toetse (spesifiseer)

Notes on examinations
Opmerkings by ondersoek

Year III.—*Jaar III.*

1. Points to:—
Wys na:—

Mouth _____ Eye _____ Nose _____ Hair _____
Mond *Oog* *Neus* *Hare*

2. Two digits:—
Twee syfers:—

(*a*) 8-1 _____ (*b*) 9-4 _____ (*c*) 3-7 _____

3. Gives own sex.
Gee sy geslag.

4. Gives surname.
Gee sy van.

5. Familiar objects (4 right):—
Bekende voorwerpe (*4 reg*):—

Pocket knife _____ Pencil _____
Sakmes *Potlood*

Door key _____ Hat (felt) _____
Deursleutel *Hoed* (*velt*)

Penny _____ Watch _____
Pennie *Oorlosie*

Box of matches _____
Vuurhoutjiedoos

6. Pictures (enumeration):—
Prentjies (*opnoeming*):—

1. _____

2. _____

3. _____

Year IV.—*Jaar IV.*

7. Three digits:—
Drie syfers:—

(*a*) 6-4-1 _____ (*b*) 3-5-2 _____ (*c*) 8-3-7 _____

8. Two lines (3 or 5).
Twee lyne (*3 of 5*).

9. Counts four pennies.
Vier pennies tel.

10. Familiar objects (no error):—
Bekende voorwerpe (*geen foute nie*):—

Pocket knife _____ Pencil _____
Sakmes *Potlood*

Door key _____ Hat (felt) _____
Deursleutel *Hoed* (*velt*)

Penny _____ Watch _____
Pennie *Oorlosie*

Box of matches _____
Vuurhoutjiedoos

11. Comprehension of questions:—
Begrip van vrae:—

(*a*) When you are sleepy.
As jy vaak is.

(*b*) When you are cold.
As jy koud voel.

(*c*) When you are hungry.
As jy honger het.

12. Six syllables.
Ses lettergrepe.

Year V.—*Yaar V.*

13. Copies square.
Vierkant namaak.

14. Knows age.
Ken ouderdom.

15. Ten syllables.
Tien lettergrepe.

16. Four digits:—
Vier syfers:—

(*a*) 4-9-3-7 _____ (*b*) 2-8-5-4 _____ (*c*) 7-2-6-1 _____

17. Aesthetic comparison (no error).
Estestiese vergelyking (*geen foute nie*).

18. Patience (2 of 3 trials: 1 min.).
Kaartspel (*2 uit 3 pogings: 1 min.*).

19. Comparison of weights.
Vergelyking van gewigte.

20. Colours:—
Kleure:—

Red _____ Green _____ Blue _____ Yellow _____
Rooi *Groen* *Blou* *Geel*

Year VI.—*Jaar VI.*

21. Definition (use and no error):—
Definisie (*gebruik en geen foute nie*):—

Chair _____ Table _____ Doll _____
Stoel *Tafel* *Pop*

Pencil _____ Horse _____ Fork _____
Potlood *Perd* *Vurk*

22. Memory for commissions.
Geheue vir opdragte.

23. Comprehension of questions:—
Begrip van vrae:—

(*a*) Raining.
As dit reent.

(*b*) House on fire.
As die huis aan brand is.

(*c*) Wheel falls out.
As 'n wiel uitval.

24. Pictures (description).
Prentjies (*beskrywing*).

25. Coins (4 right):—
Muntstukke (*4 reg*):—

6d. _____ 1d. _____ 1s. _____ 3d. _____

26. Twelve syllables.
Twaalf lettergrepe.

27. Right and left:—
Regs en links:—

R. hand_____ L. eye_____ R. ear_____
R. hand *L. oog* *R. oor*

28. Counts 13 pennies.
Tel 13 pennies.

Year VII.—*Jaar VII.*

29. Knox C (1st attempt.)
Knox C (1ste poging).

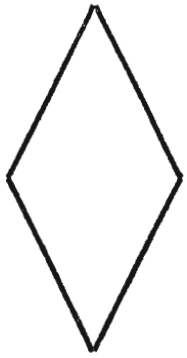
30. Omissions in pictures.
Uitlatings in prentjies.

31. Number of fingers.
Aantal fingers.

32. Sixteen syllables.
Sestien lettergrepe.

33. Copy diamond.
Ruit namaak.

34. Bow-knot.
Dubbel-strik maak.



Year VIII.—*Jaar VIII.*

35. Comprehension of questions.
Begrip van vrae.

(*a*) Break someone's things.
As jy iemand se goed breek.

(*b*) Late for school.
As jy laat is vir skool.

(*c*) If playmate hurts you unintentionally.
As jou maat jou onopsetlik beseer.

36. Days of week.
Dae van die week opnoem.

37. Counting backwards (20-1).
Agteruit tel (20–1).

38. Three digits (backwards):—
Drie syfers (agteruit):—

(*a*) 2–8–3_____ (*b*) 4–2–7_____ (*c*) 9–5–8_____

39. Differences.:—
Verskille:—

Water-milk; stone-egg; wood-glass.
Water-melk; klip-eier; hout-glas.

40. Five digits:—
Vyf syfers:—

(*a*) 5–2–9–4–7_____ (*b*) 6–3–8–5–2_____ (*c*) 9–7–3–1–8_____

Year IX.—*Jaar IX.*

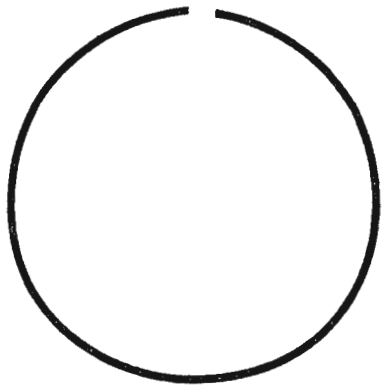
41. Dictation: "See the little boy".
Diktee: „Kyk na die hondjie".

42. Similarities (2 things): Dog-horse; apple-peach; wood-coal; iron-silver.
Ooreenskomste (2 voorwerpe): Hond-perd; appel-perske; hout-steenkool; yster-silwer.

43. Making sentences (3 words): Boy-river-stone; man-horse-cart; work-money-men.
Sinne maak (3 woorde): Jongetjie-rivier-klip; man-perde-kar; werk-geld-mans.

44. Ball and field (inferior plan).
Bal soek in veld (plan van swak gehalte).

45. Knox D (1st attempt).
Knox D (1ste poging).



Year X.—*Jaar X.*

46. Definitions (superior to use):—
Definisies (beter as gebruik):—

Horse; Chair; Table; Fork.
Perd; Stoel; Tafel; Vurk.

47 Arithmetic (1 and 2).
Rekene (1 en 2).

48. Months of the year.
Maande van die jaar.

49. Arranging weights.
Rangskikking van gewigte.

50. Healy and Fernald.
Healy en Fernald.

51. Detecting absurdities.
Ontdekking van ongerymdhede.

Year XI.—*Jaar XI.*

52. Calculating change.
Berekening van kleingeld.

53. Designs.
Patroontekenings.

54. Four digits (backwards):—
Vier syfers (agteruit):—

(*a*) 6–5–2–8_____(*b*) 4–9–3–7_____(*c*) 8–6–2–9_____

55. Six digits:—
Ses syfers:—

(*a*) 2–5–0–3–6–4_____(*b*) 8–5–3–9–1–6_____(*c*) 4–7–1–5–8–2_____

56. Finding rhymes.
Rymwoorde vind.

57. Reading and memories.
Lees en onthou.

Year XII.—*Jaar XII.*

58. Twenty syllables.
Twintig lettergrepe.

59. Word association (60 words: 3 min).
Assosiasie van woorde (60 woorde in 3 min.).

60. Comprehension of questions:—
Begrip van vrae:—

(*a*) Why save money.
Waarom ons geld spaar.

(*b*) Before beginning something difficult.
Wat ons te doen alvorens iets moeiliks te begin.

(*c*) Judge more by actions than words.
Oordeel deur dade liewer as deur woorde.

61. Ball and field (superior plan).
Bal soek in veld (plan van beter gehalte).

Year XIII.—*Jaar XIII.*

62. Finding likenesses (3 things).
Ooreenkomste vind (3 voorwerpe).

63. Dissected sentences (a, b and c) (2 out of 3).
Verdraaide sinne (a, b en c) (2 uit 3).

64. Pictures (interpretation).
Prentjies (verklaring).

65. Problem questions.
Probleemvrae.

66. Vocabulary (21 words correct).
Woordeskat (21 woorde reg).

Year XIV.—*Jaar XIV.*

67. Definitions abstract words: Pity; honesty; justice; envy; revenge.

Definisies van abstrakte woorde: Medelye; eerlikheid; regverdigheid; afguns; wraak.

68. Interpretation of fables (4 points).
Verklaring van fabels (4 punte).

69. Reasoning test 1 (a or b correct).
Redeneringstoets 1 (a of b reg).

70. Enclosed boxes.
Ingeslote dosies.

Year XV.—*Jaar XV.*

71. Knox E (2nd attempt).
Knox E (2de poging).

72. Vocabulary (30 words correct).
Woordeskat (30 *woorde reg*).

73. Reasoning test 2.
Redeneringstoets 2.

74. Induction test.
Induksietoets.

75. Arithmetic (3, 4, 5—two correct out of the three).
Rekene (3, 4, 5—*twee reg uit die drie*).

Year XVI.—*Jaar XVI.*

76. Difference between abstract words: Laziness-idleness; poverty-misery; avarice-thrift; lie-mistake; character-reputation.

Verskil tussen abstrakte woorde: Luiheid-ledigheid; armoede-ellende; gierigheid-spaarsaamheid; leuen-vergissing; karakter-reputasie.

77. Absurdity 1.
Ongerymdheid 1.

78. 26 Syllables.
26 *Lettergrepe.*

79. Five digits (backwards):—
Vyf syfers (*agteruit*):—

(*a*) 6–9–4–8–2 (*b*) 3–1–8–7–9

Year XVII.—*Jaar XVII.*

80. Paper cutting test.
Papiersnytoets.

81. Absurdity 2.
Ongerymdheid 2.

82. Drawing reversed triangle.
Omgekeerde driehoek teken.

Year XVIII.—*Jaar XVIII.*

83. Disarranged sentences—(*d*).
Verdraaide sinne—(*d*).

84. Filling cans—Arithmetic 6.
Opvulling van kanne—Rekene 6.

85. Reasoning test 3.
Redeneringstoets 3.

86. Seven digits:—
Sewe syfers:—

(*a*) 2–1–8–3–4–3–9 (*b*) 9–7–2–8–4–7–5

Year XIX.—*Jaar XIX.*

87. Vocabulary (41 words correct).
Woordeskat (41 *woorde reg*).

88. Disarranged sentences—(*e*).
Verdraaide sinne—(*e*).

89. Absurdity 3.
Ongerymdheid 3.

90. Six digits (backwards):—
Ses syfers (*agterstevoor*):—

(*a*) 4–7–1–9–5–2 (*b*) 5–8–3–2–9–4

Year XX.—*Jaar XX.*

91. Filling cans—Arithmetic 7.
Opvulling van kanne—Rekene 7.

92. Eight digits:—
Ag syfers:—

(*a*) 7–2–5–3–4–8–9–6 (*b*) 4–9–8–5–3–7–6–2

93. Seven digits (backwards):—
Sewe syfers (*agterstevoor*):—

(*a*) 4–1–6–2–5–9–3 (*b*) 3–8–2–6–4–7–5

ENGLISH:—

Johannesburg, 5th September. A fire last night burned three houses near the centre of the city. It took some time to put it out. The loss was fifty thousand pounds and seventeen families lost their homes. In saving a girl who was asleep in bed a fireman was burnt on the hand.

ARITHMETIC:—

1. Peter plays marbles. He starts with 15. First he loses 8 and then he wins 6. How many has he then? (47)

2. John's grandmother is 86 years old. If she lives, in how many years will she be 100 years old? (47)

3. If a man's salary is £20 per month and he spends £14 per month, how long will it take him to save £300? (75)

4. If two pencils cost 5 pence, how many pencils can you buy for 50 pence? (75)

5. At 15 pence a yard how much will 7 feet of cloth cost? (75)

6. Given a three-pint measure and a five-pint measure, how will you measure out ONE pint exactly, using nothing but these two vessels and not guessing at the amount? Begin by filling the three-pint vessel first. (84)

7. Given a three-pint and a five-pint vessel measure out exactly 7 pints. (91)

AFRIKAANS:—

Johannesburg, 5 September. Gisteraand het 'n vuur drie huise naby die middel van die dorp afgebrand. Dit het 'n tyd geneem om die vuur dood te maak. Die skade was vyftig duisend pond, en sewentien families is nou sonder huis. Terwyl 'n brandweerman 'n meisie, wat in haar bed aan slaap was, gered het, het hy sy hande verbrand.

REKENE:—

1. Piet speel albaster en hy begin met 15. Hy verloor eers 8 en wen later 6. Hoeveel het hy dan? (47)

2. Jan se ouma is 86 jaar oud. As sy aan die lewe bly, hoeveel jare sal dit duur voordat sy 100 jaar oud is? (47)

3. As die salaris van 'n man £20 per maand is en hy gee £14 per maand uit, hoe lank sal hy neem om £300 bymekaar te maak? (75)

4. As 2 potlode 5 pennies kos, hoeveel potlode kan jy vir 50 pennies koop? (75)

5. Teen 15 pennies per jaart, hoeveel sal 7 voet van die stof kos? (75)

6. Iemand gee jou 'n drie-pint-kan en 'n vyf-pint-kan. Hoe sal jy presies EEN pint afmeet as jy net hierdie twee kanne gebruik en nie eenvoudig skat nie? Begin deur eers die drie-pint-kan vol te maak. (84)

7. Iemand gee jou 'n drie-pint-kan en 'n vyf-pint-kan, meet presies 7 pinte af. (91)

ABSURDITIES:—

1. The three men laughed, they stopped suddenly as the eyes of each met those of the others across the table. (77)

2. Bill Smith, who afterwards married his widow's sister, always said it was a man's misfortune if he had a bad sister, but his own fault if he had a bad wife. (81)

3. Every rule, even this one itself, has an exception. (89)

ONGERYMDHEDE:—

1. Die drie mans het gelag, en skielik hou hulle op toe die oë van elkeen die oë van die ander mans oorkant die tafel ontmoet. (77)

2. Willem Smit, wat later met sy weduwee se suster getroud is, het altyd gesê dat dit 'n man se ongeluk was as hy 'n slegte suster het, maar sy eie skuld as hy 'n slegte vrou het (81)

3. Daar is 'n uitsondering op elke reël—selfs op hierdie een. (89)

Disarranged sentences:—

(a) A defends dog good his master bravely. (63)
(b) For the country an we started early at hour. (63)
(c) To asked paper my teacher correct I my. (63)
(d) Hardest the us solution gives the satisfaction of problems greatest the. (83)
(e) Not good worth be of easily a over-estimated the name can. (88)

Verdraaide sinne:—

(a) Verdedig 'n dapper hond goeie baas sy. (63)
(b) Ons vakansie plaas toe vir gaan die. (63)
(c) Ek het meester my verbeter gevra werk te. (63)
(d) Peerboom die rus skaduwee in man die se gaan ongesnoeide. (83)
(e) Moeilikste die ons oplossing gee die bevrediging van probleme grootse die. (88)

REASONING TESTS:

1a. Jack said to his sisters: "Some of my flowers are buttercups". His sisters knew that all buttercups are yellow. Ann said: "All your flowers should be yellow". Mary said: "Some of your flowers are yellow". Hester said: "None of your flowers are yellow". Which girl was right? (69)

1b. My brother wrote to me: "To-day I have walked from Rietfontein where I had an accident yesterday and broke one of my limbs". Can you find out from this what he had probably broken—his right arm, left arm, right leg or left leg? (69)

2. I started from the door of my house and walked 100 yards. I turned straight to the right and walked 50 yards. I turned straight to the right again and walked 100 yards. How far am I from the door of my house? (73)

3. A pound of meat should roast for half-an-hour. Two pounds of meat should roast for three-quarters of an hour. Three pounds of meat should roast for one hour. Eight pounds of meat should roast for two hours and a quarter. Nine pounds of meat should roast for two hours and a half. From this can you discover a simple rule by which you can tell from the weight of a joint how long it should roast? (85)

REDENERINGSTOETSE:—

1a. Willem sê vir sy susters: „Party van my blomme is botterblomme". Sy susters weet dat alle botterblomme geel is. Anna sê toe: „Al jou blomme moet geel wees". Lenie sê: „Party van jou blomme moet geel wees". Hester sê: „Nie een van jou blomme is geel nie". Watter meisie is reg? (69)

1b. My broer skryf aan my: „Ek het vandag van Rietfontein af gestap, waar ek gister 'n ongeluk gehad het en een van my liggaamsdele gebreek het". Kan jy hieruit aflei wat hy waarskynlik gebreek het—sy regterarm, linkerarm, regterbeen of linkerbeen? (69)

2. Ek begin by die deur van my huis en loop 100 tree. Ek draai presies regs en loop 50 tree. Daarna draai ek weer presies regs en loop 100 tree. Hoe ver is ek van my huis se deur af? (73)

3. 'n Pond vleis behoort 'n halfuur te braai. Twee pond vleis behoort driekwartier te braai. Drie pond vleis behoort 'n uur te braai. Ag pond vleis behoort twee en 'n kwartier te braai. Nege pond vleis behoort twee-en-'n-halfuur te braai. Kan jy 'n eenvoudige reël opstel waardeur jy volgens die gewig kan bereken hoe lank 'n stuk vleis behoort te braai? (85)

VOCABULARY

1. orange
2. grip
3. steamer
4. parent
5. four
6. search
7. rabbit
8. lord
9. report
10. tower
11. suppose
12. scenery
13. polo
14. advance
15. farther
16. pellet
17. tunic
18. chrysanthemum
19. rogue
20. household
21. strain
22. heroism
23. overdue
24. prank
25. isolate
26. aloe
27. recharge
28. leisurely
29. array
30. fluke
31. crest
32. mutineer
33. barb
34. sprightly
35. finality
36. vitality
37. timorous
38. refinement
39. authorise
40. sentiment
41. synopsis
42. nullify
43. epoch
44. offing
45. grandiloquent
46. corona
47. philology
48. monochromatic
49. sidereal
50. germane

WOORDESKATTOETS

1. dam
2. gare
3. hokkie
4. vooros
5. soheentoe
6. stokdoof
7. handskoenmaker
8. Kleurling
9. naweek
10. smeek
11. luiperd
12. onaangenaam
13. heiden
14. moedswilligheid
15. euntjie
16. aangeklaagde
17. juwelierswinkel
18. tas
19. ondertussen
20. bloutong
21. skeeloog
22. verowering
23. aluminium
24. redenering
25. ongeag
26. sakie
27. onnatuurlik
28. oplei
29. remskoen
30. karaat
31. ellendeling
32. bondgenoot
33. verkwik
34. gelaatstrek
35. punktuasie
36. kontrakteur
37. bandelier
38. distilleer
39. deursig
40. krediteur
41. dyk
42. kwansel
43. indigestie
44. koffieservies
45. vanweë
46. isoleer
47. imperiaal
48. verstoktheid
49. droesem
50. passement