

PATHWAYS TO PARSIMONY IN REMEDIAL EDUCATION

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A Paper

Presented to

the Faculty of the Department of Psychology

University of Houston

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts

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By

Charlsa Trammell Lowell

August, 1970

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## ABSTRACT

After defining the population of children assumed to have a learning disability, the author contends that the time, money, and human effort available for their remediation will be employed more parsimoniously as the theoretical strategies increase in validity and as behavior modification techniques are more systematically employed.

A thorough diagnostic evaluation of the child through a multi-disciplinary approach is considered an essential basis for the individualized programming the child requires. Theories of well-known psychologists and educators working with children with learning deficits are examined and the decision reached that controlled studies will be required to ascertain the validity of these procedures and their theoretical bases. Some of the systems are examined for their inclusion of known learning principles with the conclusion that too many variables are left uncontrolled, even when the use of such principles appear to be inherent in the procedures.

Lastly the systematic application of operant conditioning principles in a number of studies involving children with learning and behavioral disorders are considered and their results are thought to point the way to a more parsimonious use of time, money and human resources.

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## CHAPTER I

### THE CHILDREN WHO CANNOT LEARN

For generations educators have known there were children of average or better intelligence who did not or could not keep pace with their peers. Prior to the past few decades, parents and teachers of these apparently capable children often categorized them as "lazy" or "daydreamers" or "just not trying." Such children, of course, probably do exist, but the ones we now classify as having a "learning disability" are the five or six children out of every thirty in the typical classroom who find the demands of the curriculum truly unattainable or to be met only at the expense of far greater effort than is required of their "normal" peers (Kephart, 1967).

What are they like, these children who cannot learn?

They are characterized by:

...immaturity, dysrhythmia, short attention span, hyperactivity, poor fine motor control, non-specific awkwardness, daydreaming, difficulty in gestalt function and generalized inadequacy of perceptual-motor function, plus an inability to learn the language arts skills, despite average or high intelligence (Drake, 1966, p. 98).

They can be described as:

...a group of children who are not deaf but could not hear, not blind but could not see, not

mentally retarded but could not learn (Kirk, 1966, p. 36).

It can be said that they:

...do not see what we see nor hear what we hear. They do not experience from our learning experience what we experience. In many of these children either incoming information is disrupted so that it does not hold together, or outgoing responses are disorganized or erroneous (Kephart, 1967, p. 9).

Their problems are numerous, and multiply determined.

The symptoms of the child with learning problems are legion and encompass all aspects of behavior--in school, at home, and in the community. His deficiencies involve him in many painful situations which irritate, antagonize, or make anxious the persons he encounters. Their negative reactions tend to compound his initial difficulties. Thus neurological disturbances, developmental delays, and noxious environmental influences reinforce each other in their detrimental effect on the child's learning and development (Frostig, 1966, p. 45).

They have many symptoms in common, but the etiology of their difficulties is varied:

Learning disability cannot be viewed as a distinct clinical entity in itself, but must be approached as a symptom reflecting disorder in one or more of the many processes involved in academic learning. Principal among these are general intelligence, specific capacities, developmental readiness, emotional freedom to learn, motivation and opportunity (Rabinovitch, 1949, p. 37).

Children with "learning disorders" are those who--due to brain damage, sensory deprivation, congenital anomaly, mental retardation, or psychoemotional disorder--fail to respond appropriately or in the usual way to common environmental stimuli and reinforcers, or who possess any disruption in the ability to form percepts and concepts according to classical theory. The term should not be applied to some mystic static phenomenon but to a dynamic behavioral pattern which is alterable by either remov-



ing or circumventing the factors contributing to the disruption of the normal learning process (Trubey, 1968, p. 374).

### Historic Attitudes

One of the first terms used for these children was "brain injured" or "brain damaged," since many of them evidenced the behavior syndrome apparent in many of the children with exogenous brain damage studied by Strauss and Lehtinen (1947), i.e., hyperactivity, distractability, rigidity, perseveration, short attention span, and emotional lability. On neurological examination, a number of these children were found to show evidence of cerebral lesions, abnormal electroencephalogram readings, or to have had a history of disease (such as encephalitis or meningitis) or of accidents (such as lead poisoning or partial asphyxiation) which frequently result in cerebral insult (Richardson, 1966). In many instances, however, careful medical examinations failed to reveal brain damage but the child's behavior supported the diagnosis of "brain dysfunction." The term "minimal brain injury" was then applied in the conviction that the great majority of these children, if not all of them, would ultimately be identified as having some type of neurological insult when diagnostic instrumentation was sufficiently advanced (Cruikshank, 1961).

Dissatisfaction with terminology suggesting that the etiology of a learning disability was due to cerebral damage re-

sulting in a "Strauss Syndrome" behavior pattern increased since this concept was demonstrably inaccurate and inadequate. (1) It was inaccurate because brain damage may vary greatly with respect to etiology, extent, locus, type of lesion, etc., and with respect to the syndromes of dysfunction that may result (Silver, 1970). Drake has found, also, that while children with a known history of brain damage have a vast range of symptoms, fewer than half of those children with brain damage who come through the Speech and Hearing Clinic at Northwestern University have symptoms of a language disorder (Drake, 1966). (2) It was inadequate because other conditions can also interfere with a child's learning processes. A brief but highly traumatic period in a child's life may disrupt his behavior so markedly that he is unable to learn because of his uncontrolled behavior. Or a less traumatic but very prolonged emotional disturbance can cause continued emotional stress with a resulting adaptation to this stress following Selye's general adaptation syndrome. (Selye (1956), a prominent endocrinologist, hypothesized that the body's reaction under stress occurs in three stages: (a) the alarm reaction wherein the organism reacts with the bodily changes seen in emotional arousal; (b) the stage of resistance wherein the increased activity of the anterior pituitary and the adrenal cortex enable the organism to adjust to continued stress; and (c) the stage of exhaustion when the organism can no longer maintain its resistance. The continued overactivity

of these and other endocrines can result in tissue damage to the organism, while the development of resistance to the particular stressor leaves the organism overly vulnerable to other stressors.) As a consequence, there is an interference with functional relationships within the central nervous system producing an effect very similar to brain injury (Kephart, 1967). (3) The concept that the learning disability was due to a brain injury resulting in the "Strauss Syndrome" was further inadequate because the child with a developmental lag in the perceptual motor area (Koppitz, 1964) and the child in a highly inadequate physical or social environment (Frostig, 1966) may also develop learning disabilities due to lack of adequate experience or because of experience acquired out of its proper sequence. (4) It was inaccurate because many of the children who evidence learning disorders do not have the behavioral characteristics of the "Strauss Syndrome."

Since the child's inability to learn normally suggested subtle disturbances of the central nervous system, a new diagnostic label, "minimal cerebral dysfunction," came into being. However, until increased understanding of the nervous system clarifies the issues, it is desirable to avoid use of a label which indicates an understanding of etiology or pathogenesis (Silver, 1970). There is, in addition, the strong possibility that the various factors affecting the child's ability to "learn" are distributed normally, just as are

height, strength of grip, etcetera. The educator might then, simply on the basis of statistical prediction, anticipate that certain portions of his student population will have handicaps or advantages in acquiring an education. Labels such as "learning disability" or "learning disorder" are, therefore, growing in popularity; and though they are no more functionally useful than "brain damaged" or "minimal cerebral dysfunction," they help to avoid the educator's feeling of hopelessness and the parents' distress at the stigma of this label (Hewett, 1968).

#### Current Status

Nomenclature for these children is still nearly as varied as its users, despite the decline in usage of the terminology suggesting cerebral damage. A recent study was conducted by McDonald (1968) on the classification of children with learning disabilities. Of thirty-five professional workers in this field who replied to his questionnaire, twenty-two used labels such as brain-injured, developmental imbalance, educationally handicapped, interjacent children, language disorders, minimal brain dysfunction, psycholinguistic disabilities, psychoneurological disorders, reading disabilities, etcetera. Many of these terms were used as exact synonyms for the term "learning disorders."

Most concerned professionals agree that children with neurological dysfunctions coupled with average or better intelligence occupy center stage in the category "children

with learning disabilities." The controversy lies in whether to include children who are retarded, culturally disadvantaged, emotionally disturbed, physically disabled or handicapped by developmental imbalances. For the purpose of this paper the population of children in question will be categorized as follows:

Learning disabilities may be loosely described as disorders in symbolic language functions (e.g., reading, speaking, writing, spelling, arithmetic) which are characterized by a discrepancy between apparent capacity for performance and the actual level of functioning in that area (Batemen, 1964, p. 1).

By specifying the behavioral effects of the disability and omitting its etiology, this definition avoids the polemical issues yet still defines the population under consideration. What it loses in precision it gains by avoiding controversy.

#### Remedial Implications

As indicated by the descriptions above, learning disorders arise from a variety of causes such as neurological dysfunctions, immaturity, emotional disturbance, a lack of experiential basis for learning, or lags in specific developmental functions. Some will show a combination of causes and most will have some emotional maladjustment as a result of the pain and frustration in attempting to deal with their environments with inadequate tools (Koppitz, 1964; Hewett, 1968; Frostig, 1966). The variety of causal agents in indicated by the results of different remedial approaches:

In fact, when these children are placed in various remedial settings, it becomes apparent that some begin to learn following psychotherapy with remediation, some with psychotherapy alone; some begin to learn when they are given visual-motor training; some show marked improvement when they are provided a corrective optical lens and orthoptic training. Some of these youngsters show remarkable improvement with specialized remedial reading such as the Fernald and Gillingham methods; some do well with remedial reading after they have received visual-motor training; and some seem to "grow out of it." ... Very often it is not until a child responds to a particular teaching technique that the underlying cause of his disability becomes apparent (Richardson, 1966, p. 18).

## CHAPTER II

### DIAGNOSIS FOR REMEDIAL PLANNING

If the remedial education of children with learning disabilities is to be a parsimonious one, the system or strategy for attaining the remedial goal must be valid and the methodology for implementing this strategy must provide for maximum learning with a minimum expenditure of time, money, and human effort. Just as the value of a diagnostic instrument increases as it improves in both validity and reliability, so also does a remedial system increase in parsimoniousness as it improves in efficacy and efficiency.

Since the etiologies of learning disabilities are so varied and so complex, a correct diagnosis obviously leads to more economical expenditure of effort in correcting the disability. The diagnosis, however, must be more than a label. As Gallagher (1966) has said:

The tranquilizing effect on a profession of the application of some distinguished label and accompanying description such as schizophrenia, infantile autism, or minimal brain injury is too well known to require comment. These terms describe extraordinary, vague entities, explain nothing, and lead to no clear description as to what should be done. They provide only a false sense of order and knowledge (p. 27).

If steps are to be found to re-educate, re-orient, or supply needed experience on which improved functioning may be developed, diagnosis must point the way to remediation (Capobianco, 1964-1965; Kirk, 1966).

#### Familiarity with Developmental Stages

If the diagnostician is to determine the extent of the child's deviation from the normal developmental progression of childhood, he must be familiar with the basic developmental pattern, and aware that while the exact times at which developmental abilities emerge are partially determined by individual differences and partially by the particular culture, the sequence in which the abilities unfold is set and independent of the culture (Erikson, 1950). The behavior deviations of children should, therefore, be considered in terms of the developmental sequence.

Sensory-motor Stage. The sensory-motor phase comprises the first developmental sequence. During this phase the infant first becomes familiar with his own body, what the parts are, what responses they can make and how to produce these responses (Kephart, 1967). He explores the world around him by simultaneously applying all his sensory modalities and movement to an exploration of his environment. For example, given a rattle, he will shake it, listen to it, bite it, feel it, look at it, throw it down and pick it up. He will try to comprehend "rattle" with all his senses, and at the same time he will move it around. Without this integration of sensory experience and simultaneous movement, he cannot have a correct



perception of the outside world.

Language Stage. The child begins to use language during his second year and establishes spoken language in all its main forms between the third and fourth year. He understands and can communicate his awareness of experiences in the past and in the present, and his expectations about the future. Without language it is impossible for him to transcend the present.

Language ability permits conceptualization and communication of the non-present, and helps the child to comprehend a wider world than that which can be explored by sensory-motor functions; and because language enhances communication skills, it also accelerates social development. When a child learns to speak, his former parallel play changes more and more to play in which he interacts with other children. Language permits him to become a social being (Frostig, 1968, p. 237).

Perceptual Stage. The phase of maximum perceptual development follows and overlaps the phase of maximum language development, and lasts from about four to seven and one-half years of age. The child tries to understand the world directly, perceptually, without using cognitive processes to evaluate the reality of the information he receives through his senses. During this phase the child continues to learn by manipulation, but he also learns to perceive objects without touching or moving them. He develops the ability to recognize and understand the physical aspects of his environment, but learning is still easiest for him when objects can be manipulated.

Cognitive Stage. Higher cognitive processes begin their development at approximately six or seven years of age when the child begins to use reason in judging his experiences.

He uses perception less and less as a primary source of information and more and more as a confirming function. ... At this final stage in development, the concept takes over and controls the percept (Kephart, 1967, p. 32).

At the same time, the child's memory becomes more accurate so that his experiences, both past and present, become better integrated. He can compare and analyze and make inferences in a more systematic fashion. Judgment develops. This stage lasts until the child is approximately 11 to 13 years old, by which time his cognitive processes have become more abstract and he learns to think in adult fashion.

Social Adjustment. Although sensory-motor functions, perception, language, and higher cognitive processes show maximum development at definite age levels, the child's emotional development and social adjustment mature more gradually and change throughout his life span (Erikson, 1950).

#### Multi-dimensional Model of Abilities

Since the problems gathered under the title "learning disabilities" are so complex, remediation for a given child must be based on a multi-dimensional model of his assets and liabilities. What is he like, physically, socially, and psychologically? The physician, the psychologist, the social worker and the teacher each gauge the child from a special vantage point that makes each one's contributions unique and essential.

### Medical Contributions

Pediatricians and neurologists look for physical signs that differentiate many of these children from those without learning difficulties, as mild choreoform or athetoid movements, hyper-reflexia, monocular vision or minor ocular imbalance, finger agnosia, etcetera, as well as the familiar hyper-kinetic behavior with distractability, short attention span, irritability, and emotional lability (Richardson, 1966). He may prescribe amphetamines such as Dextro Amphetamine Sulphate (Dexedrine) where there is short attention span or distractability but not hyperactivity; or Resin Complexes of d. and dl-Amphetamine (Bi-phetamine) for anxiety symptoms plus short attention span and distractability but no hyperactivity. He may expect the hyperactive child with short attention span, low frustration threshold and increased irritability to respond well to a second cortical stimulating drug, methylphenidate (Ritalin) (McDermott, 1966). If the child has minor behavior problems and abnormal EEG readings, the neurologist may prescribe diphenylhydantoin (Baldwin, 1966) since it has so often proved effective. The physician may consider that the amount of stress which has been superimposed on the basic organic disability has increased the child's anxiety to the point where he has become emotionally maladjusted and requires psychiatric help (Ong, 1966).

Numerous experiments have shown that complex types of human activity require a whole system of cerebral sectors

working simultaneously, each assuring the different conditions that are indispensable to the complexity of psychic activity. The neurologist brings his understanding of this intricate mechanism to the remediation of learning disabilities when he diagnoses:

Thus, if the auditory analysis of the structure of words is essential in order to write from dictation (and to write independently), damage to the left temporal zone (cortical zone of visual and spatial analyzer) without fail entails the disorganization of drawing skills and activities based on geometric schemes which depend on spatial analysis, but this lesion is without influence on the auditory analysis of words and musical training which take place without reference to visuo-spatial relations (Luria, 1968, p. 140).

His diagnosis more than a label. It points the way to remediation:

Education must be rigorously differentiated. That is to say, it must proceed from an analysis of the nature of the damage and must emphasize the factor whose loss is at the origin of the loss of understanding or skill: auditory analysis and synthesis factor, kinesthetic and cenesthetic factor, or the factor related to the successive and dynamic analysis of processes.

For example, it is senseless for a patient whose writing troubles derive from damage to the auditory analytic and synthesizing powers to be exercised at copying texts. On the other hand, if his difficulties in writing result from damage to the spatial and visual synthesis or analysis, or destruction of the dynamic schemes of the nervous processes (pathological inertia of established stereotype), it will be useless and ineffective to exercise him in the analysis of the auditory structure of words (Luria, 1968, p. 143-144).

### Psychological Assessment

The psychologist uses a battery of tests plus his clinical observation of the child to construct his contribution

to the total diagnostic picture. Since a wide assortment of psychological measuring instruments exists, the psychologist must learn to choose judiciously among them. He should be familiar with their validity for use with his particular population of subjects as well as their validity and reliability with the normative population (Rice & Brown, 1967). He must learn to obtain maximum information from a few well-chosen tests, but must use enough tests to form a consistent hypothesis which can be supported by more than one test or behavioral observation (Bateman, 1964).

Sensory-motor Functioning. For the evaluation of sensory-motor development, the psychologist may supplement his personal observations of the child with an instrument such as Kephart's Perceptual Survey Rating Scale (Kephart, 1960) or the Lincoln-Oseretsky Motor Development Scale (Sloan, 1955) to appraise the child's flexibility, balance, speed, and agility, strength and rhythm, laterality, gross and fine motor coordination and ocular tracking abilities (kephart, 1960).

Language Development. To check basic language functions, the psychologist may use the Illinois Test for Psycholinguistic Abilities (Kirk & McCarthy, 1961). This instrument was designed to pinpoint specific areas of language disability and is highly recommended by many psychologists (Bateman, 1964-1965; Frostig & Maslow, 1969; Johnson & Myklebust, 1967). The ITPA is based on a clinical model of the communication process developed by Osgood (1957). It measures only 12 of

the more than 40 functions defined by Osgood's model, but the remainder are largely irrelevant for education. Three major dimensions are postulated to specify a given psycholinguistic ability. The first dimension is Level of Organization, with two levels described: (1) The representational level which is sufficiently organized to mediate activities requiring the meaning of linguistic symbols; and (2) the automatic-sequential level "which mediates activities requiring the retention of linguistic symbol sequences and the execution of automatic habit-chains (Kirk & McCarthy, 1961, p. 3)." Psycholinguistic Processes compose the second dimension and include three main sets: decoding, encoding and association. Channels of Communication, describing the sensori-motor path by modality, is the third dimension.

Cognitive Processes. The Wechsler Intelligence Scale for Children (Wechsler, 1949) is routinely used by many psychologists in delineating the areas of cognitive malfunctioning. When a child has difficulty in achieving at his age level, it is useful to prove that a discrepancy between his apparent capacity for performance and his actual level of functioning actually exists, and what the capacity appears to be. Many problems are solved with this instrument when it is determined that apparent capacity and achievement actually coincide and that the child has been pressured to perform beyond his capacity (Ames, 1968).

The WISC is divided into subtests which can be analyzed into subtest patterns if the analyst remains constantly aware that there is a large loading of the "G" factor in each subtest, and that no subtest at any age has as much as one-third of its variance attributable to specificity (Cohen, 1959). With this communality of the subtests understood and an awareness that a large inter-subtest difference is needed (Hopkins & Michael, 1961), the WISC may be employed to assess long and short-term memory, concept formation, analyzing and synthesizing ability, social comprehension, psychomotor speed, and so forth.

Visual Motor Perceptual Abilities. To check the child's visual motor perceptual progress, the psychologist may use the Bender Visual Motor Gestalt Test (Koppitz, 1964). If the child fails to perform at the level indicated by his mental age, the Frostig Developmental Test of Visual Perception (Frostig & Horne, 1964) may be used to separate the visual and motoric components of the disability. The Frostig evaluates visual-motor coordination, figure-ground perception, perceptual constancy of shape, perception of position in space, and perception of spatial relationships. Normative data is given to the age of eight years, but the gradations in ability are rather gross.

Auditory Functioning. If the child displays any difficulty in differentiating speech sounds, data gained on the ITPA's auditory subtests may be supplemented by usage of the

Wepman Auditory Discrimination Test (Wepman, 1958, 1960). Pairs of words are read to the child and he must indicate whether he is able to determine their similarity or difference.

The list is very long and the psychologist must have a supply of instruments which he can use efficiently and economically as the situation dictates. He must also supplement his flexible test battery with observations of the child in the testing situation. How does he react to the situation and to this new person? Has he established hand and eye dominance, and are they dominant on the same side (Orton, 1937)? How does he use his hands in dealing with the testing materials? How adequate is his attention span? Is he able to absorb and carry through with one-, two-, or three-part instructions? What directionality has he established (Kephart, 1960)? What is his response to the primary stimuli presented to him? To extraneous stimuli? Is he persistent in completing the tasks given him (Green, 1966)? What is his socio-cultural and economic status?(These are important variables the diagnostician must bear in mind while evaluating all the other findings.) Again the list is long.

#### Teacher's Observations

The teacher makes many of the same observations, but from the standpoint of the child's behavior in a very different environment. The child's behavior in the new and stimulating interview with the psychologist and in a one-to-one



relationship may be quite different than the behavior he displays in the classroom. He may react negatively to the teacher's authority or to his peers' competition. The stimuli of the classroom may be overwhelming. His capacity to work may be affected, also, by the length of the school day, since some children with learning disorders can cope only if they attend for a shortened day (Ames, 1968). He may be able to tolerate an adult's presence more easily than he can that of 30 or more of his peers. He may be hyperactive in the morning and hypoactive in the afternoon (Drake, 1966). These and many other observations are possible only from the teacher's position.

#### The Social Worker's Addition

The social worker adds to this growing portrait of the child with an anamnestic history of the child's known developmental experiences, both pre- and post-natal. She interviews parents and child separately and together in order to gain an understanding of the home environment with which the child must cope and of the type of parent-child relationships that appear to exist, as the child's behavioral symptoms will be influenced not only by the way he feels about himself but by the way people feel about him (Ong, 1968). Most frequently, the child's learning disability will cause a disturbance in the parent-child relationships, rather than vice versa (Ames, 1968). The social worker's observations may help to clarify this segment of the diagnostic puzzle, and perhaps

lead to help in assuaging the parents' feelings of guilt for their contribution to the child's difficulties.

### Remedial Procedures Outside the School

When all this data has been collected, and carefully fitted together like a jigsaw puzzle, many of the mysteries will have been removed. The child who seemed so unpredictable can be understood and anticipated (Kephart, 1967). When the educator is apprized of all the child's assets and liabilities, he can devise a way to teach him "by either removing or circumventing the factors contributing to the disruption of the normal learning process (Trubey, 1968, p. 374)."

This diagnostic process may turn up many problems that can be solved outside the school room. The child may require surgery, corrective lenses, hearing aids, speech therapy, fusion training, medication, or psychotherapy. He may need a change in home environment. He may be able to learn in a regular classroom if he is demoted to a more appropriate grade level, placed nearer the teacher or the chalkboard or away from distracting influences, given a shorter school day, put under less pressure to produce or given a teacher with a more compatible personality. He may require a combination of these remedial aids and educational therapy as well, or the latter alone may be the procedure of choice (Frostig, 1968; Richardson, 1966).

## CHAPTER III

### THE REMEDIAL PROGRAM

#### Planning the Strategy

Remedial education must be based on new pedagogical principles. Classical educational practices have already been tried and found ineffective with these children (Kephart, 1967). Educational therapy does not consist of presenting the regular work more slowly, more loudly, or in brighter colors, though all these things may help. Educational therapy requires an entirely new way of approaching the child, and innovators in this field agree on many of the important principles.

Individualized Programming. Although learning principles indicate that every child, normal, gifted, or otherwise, will profit from an educational program tailored to his particular needs, the urgent needs of the child with a learning disability require that his educational program must be based on the diagnostic findings and "strikingly" individualized if the educational procedures are to be effective. (Ames, 1968; Bateman, 1964-1965; Capobianco, 1964-1965; Carlson, 1968; Dubnoff, 1966; Ebersole, Kephart and Ebersole, 1968; Frostig & Maslow, 1969; Gonik & Ayers, 1966; Luria, 1968; Myklebust, 1968).

Given the facts determined by the diagnostic procedure, the educator must develop a working hypothesis concerning the child's behavior which he is prepared to adjust constantly as the child reacts to the remedial program. For example, he must consider that the child's hyperactivity, distractability, etcetera, may not be due to neurological dysfunction but be a predictable, i.e., learned, reaction he uses to cope with an environment that is otherwise intolerable to him (Kephart, 1967), or a learned reaction to cope with an inborn metabolic imbalance that predisposes him to hypoactivity (Drake, 1966). He must determine whether the disability accurately reflects the extent of dysfunction that must be circumvented by training new cerebral areas to take over these functions. The problem may be partly due to the fact that early learning experiences with a particular modality were aversive because its inadequacy led so often to failure, and the child has therefore developed avoidance behaviors, resulting in an inadequate experiential basis for learning in this area (Kirk, 1966).

Restoring Developmental Progression. Certain phases of learning are hierarchical, the development of one stage being essential for the development of the next. The foundation for learning any subject must be sound or the educator is building on sand, for competence in the latter stages is dependent upon competence in the earlier stages.

Such hierarchical relationships exist on the develop-

mental level as well. Normally the child proceeds through these developmental sequences in order, solidifying the activities and generalizations appropriate to each phase before moving into the next one. Sometimes, there is an interference with learning which makes it extremely difficult for the child to master the requirements of a particular phase, but the physiological and environmental pressures on the child continue to progress as though development had continued properly. Because of such pressure, the child often finds it necessary to temporize, to behave as though he had actually progressed to the higher level.

As a result, he begins to deal with the activities and generalizations of the next stage even though the foundation has not been laid in the development of the present stage. Since the learnings of each stage are essential to and assumed in the learnings of subsequent stages, confusion develops and difficulties arise which are compounded as time goes on (Kephart, 1967, p. 33).

Usually this inadequate foundation results in a breakdown in performance at the higher stage because the child is unable to cope with the learning requirements of that level. Some children, however, though unable to acquire the psychological functions inherent in a given stage of development, do manage to cope without confusion with the work required in the next developmental phase into which they are pushed by the environment and their own physiological development. To achieve this success, unfortunately, they may permit a break to occur in the developmental process. They have

learned the activities of the higher level without reference to the more basic activities of the lower level. They have built on sandy ground.

Such children manifest their difficulties when they attempt to transfer these higher level functions into behaviors or modifications of behaviors. Because of the gap which they have permitted in the developmental sequence, the new learnings remain relatively independent of the old learnings. Since overt motor responses occurred early in the developmental stage, this gap prevents them from translating the more complex manipulations into overt behavior (Kephart, 1967, p. 33).

If the child is, eventually, to achieve at a level commensurate with his potentiality, it will be necessary to reinstate the normal developmental progression to provide the child with the essential tools for learning. Hopefully, the diagnostic procedure has determined for the educator the point in the developmental sequence where the child's achievement has broken down and has provided him with some indication of what the child may reasonably hope to achieve, given adequate remedial attention. Remedying this discrepancy then becomes the educator's task.

Task Analysis. The next step will be to analyze the task involved in moving the child from "where he is (Bateman, 1964, p. 13)," to "where he needs to be," so that it can be broken down into its component parts. The increments into which the work must be divided will vary from child to child, but it is essential to have the steps small enough to insure success at each level (Bateman, 1964, 1964-65; Carlson, 1968; Ebersole et al, 1968; Kephart, 1960, 1967; Hewett, 1968;

Luria, 1968; Johnson & Myklebust, 1967).

The steps must not only be small, they must progress slowly so that the learning at each stage has an opportunity to be reinforced frequently. The learning must be well-ingrained so that it provides a firm base for the next small step forward. The tempo of progress depends upon the child's ability to master each successive step with ease. The child, however, must progress (Johnson & Myklebust, 1967). The educator must structure both the task and the environment to this end.

A concomitant part of this procedure is the need for constant evaluation of the child's reaction to the remedial situation and a willingness to change the educational focus as it appears to be needed (Bannatyne, 1968).

#### Developing Teaching Techniques

To achieve these goals for the learning disabled child, it is necessary to develop teaching methods that facilitate the child's progress. The following procedures are advocated by renowned psychologist-educators for children with learning deficits but would benefit all children, whatever their learning capacity or school classification.

1. "Start where the child is now," and "teach to the level of involvement (Johnson & Myklebust, 1967, p. 38)." If the child has acquired learning out of sequence, this learning must be considered in the remedial planning because "the process of development is unidirectional and irreversible

(Strauss & Kephart, 1955, p. 90)." Since the child cannot give up subsequent learnings and behave as though they have never occurred, he must be offered activities designed to teach the learnings of the lower developmental phase but taking into account the changes which have occurred in later phases (Strauss & Kephart, 1955).

2. "Teach to the type of involvement (Johnson & Myklebust, 1967, p. 58)." The teaching approach must correspond to the determination of whether the deficit entails intra- or inter-sensory learning and whether there are deficiencies of integration (Johnson & Myklebust, 1967). Put more succinctly, "Adapt the method to the need (Ebersole et al, 1968, p. 14)."

3. Be aware that it is possible to teach at three levels: (a) a tolerance level at which it is easy for the child to work; (b) a level at which it is a challenge for the child to apply himself; and (c) a level which spells frustration for the child. Present teaching materials applicable to either of the first two levels, depending upon the objective of the lessons and upon the child's ability to cope with studies that day. Do not teach at the frustration level (Ebersole et al, 1968; Kephart, 1960; Johnson & Myklebust, 1967).

4. Use concrete methods even where abstractions are being taught. The learning disabilities child has difficulties with abstractions and must be led to them through small, concrete steps (Ebersole et al, 1968).



5. Structure the remedial exercises so that the child is required to perform a given task in the desired manner and not allowed to circumvent or compensate for his weak areas by handling the task with his strong abilities (Bateman, 1964).

6. The question of whether to teach to the deficit areas or to the integrities poses a very delicate problem. It will be necessary to raise the deficits without undue stimulation or demand on the disability itself and without over-emphasizing the integrity areas so that they become unduly functional. When the child becomes "completely visual" or "completely auditory" he is no longer capable to integrating certain classes of information--i.e., auditory, visual, verbal or nonverbal (Johnson & Myklebust, 1967). The approach of choice is to vary the remedial tasks in such a manner than the deficit area is raised and the information gained through one modality, whether or not it is deficient, is integrated with all of the other information being received (Bannatyne, 1968; Johnson & Myklebust, 1967).

7. It has been repeatedly shown that the child with a learning disability is distinguished from the normal child by his difficulty in integrating various types of information (Johnson & Myklebust, 1967; Myklebust, 1968; Kephart, 1960, 1967). The child tends to deal with the elements of a stimulus rather than with the total stimulus situation.

Throughout all his behavior, this child gives the impression that his world and his responses to it exist in bits and pieces with little connection

between them, rather than in clusters of similar items held together in well-knit wholes. He continues to respond to items rather than to situations and his behaviors are specific skills rather than adaptive responses (Kephart, 1967, p. 43).

It may be profitable to think of this breakdown of integration as a failure in the development of generalizations and to attack the problem by teaching the child generalizations.

The development of a generalization begins when the child acquires an isolated datum--a perceptual element if a perceptual generalization is being taught, or an isolated motor skill if a motoric generalization is being dealt with. This step ordinarily causes no difficulty so long as care is taken to see that the child is capable of making the required response.

The second step requires the acquisition of a large number of related experiences. These "variations on a theme," however, are a result of the ability to generalize, the very process that the child lacks. The teacher must, therefore, supply for the child the variations which he is unable to supply for himself.

Generalization now depends upon these elaborations coming together into a cluster which is organized and integrated into a whole. This integration is furthered by the presentation of the same information in different ways, a process called redundancy. This involves the simultaneous presentation of identical information in different ways,

i.e., the information is held constant and its presentation is varied. This constancy of the information emphasizes the similarity of the experience and, therefore, the relationship or integration of experiences (Kephart, 1967).

8. Use multi-sensory stimulation. The approach of choice may be to remediate the deficit areas and reinforce through the intact areas (Bannatyne, 1968), but it is important to organize this multi-sensory approach so that it will add to the child's learning and to the development of his organized information, rather than to his confusion (Ebersole et al, 1968). It is essential that the information presented be related to the child's most adequate source of information as a core. The teacher should take care not to overload the child's capacity to process the incoming stimuli. She should also have a specific goal in mind to be reached by this technique rather than employing it, shotgun style, in a hope that "something will get through (Johnson & Myklebust, 1967, p. 59)."

9. Reinforce desired behavior and ignore unwanted behavior (Haring & Kunzelmann, 1966; Lathen, 1966-67). Punishment does little of value but suppress ongoing behavior for the duration of the punishment and may exert complex side effects upon behavior going far beyond the teacher's expectation and control (Gonik & Ayers, 1966; Hewett, 1968). If it is essential to use punishment to suppress behavior dangerous to the child or to others, it is necessary that he be taught alternate behaviors that are acceptable and for which he receives

positive reinforcement. Otherwise, the suppressed behaviors may simply reappear when the punishment is removed.

Reinforce carefully. If the teacher rewards for effort even though the product is unsatisfactory, the child may interpret it as reward for the product (Bateman, 1964-1965). The teacher should be certain that the behavior being rewarded is a direct link in the chain of behavior leading to the final goals or is the actual standard of behavior desired (Haring & Kunzelmann, 1966; Lathen, 1966-1967).

10. Control for important variables in the learning environment depending upon the child's need.

a. The child must be motivated for the tasks. A skillful teacher uses a variety of motives ranging from the avoidance of negative consequences, such as avoiding bad grades, to pleasure in worthwhile accomplishment, and helps the child to understand the consequences of his behavior. She can thereby induce the child to continue, repeat, or abandon certain forms of behavior (Allport, 1937). If these techniques provide motivation the teacher is fortunate, for an extensive repertoire of skills cannot be built without the use of variables that are motivating to the child (Fenster, 1961). The ultimate goal is that the pleasure of learning will be sufficient motivation for the child. However, if a child has repeatedly met with failure in his attempts to learn, he may be more motivated to avoid learning tasks than to seek them out. It may be necessary to implement a

reinforcing climate since "social reinforcements" may not be considered rewarding by the child (Quay & Hunt, 1965). Depending on the level of the child, the motivators ("bribes," rewards, reinforcements) may take the form of candy, toys, free time, use of special, high-priority materials, grades, etc. By simultaneous presentation of some such reinforcing contingency with the successful completion of a task, the child is motivated to continue learning and the probable recurrence of this successful behavior is enhanced. If the social aspects of the teacher's approval also coincide with the presentation of the primary reinforcer, the teacher develops power as a secondary reinforcer. Eventually, therefore, the object reinforcers can be discontinued (Carlson, 1968; Hewett, 1969; Ferster, 1961).

b. For all these things to be possible, the child must succeed in order to be reinforced, and he must succeed often enough for learning behaviors to supercede his entrenched non-adaptive behaviors. The learning tasks, therefore, must be divided into very small increments so that he may sip the heady wine of success.

All children want to succeed, but the need to succeed is so overwhelming in the child with learning deficits, and his anxiety concerning his ability is so painful, that success becomes the strongest motivating influence. The candy, the tokens, the permission to play, the gold star, the "A" on the paper, the teacher's approval--these are most helpful in motivating the child with learning difficulties because they symbolize success (Frostig, 1966, p. 256).

c. Help the child to establish a learning set.

Children with learning deficits often find it very difficult to develop this inner preparedness for attacking a new problem, and the teacher may need to supply it for them. She can help the child to prepare to switch from one task to another by giving him advance notice that the change is coming. She can repeat directions and request him to paraphrase them back to her. She can relate the present step in the learning process to those that went before it and to those that will succeed it. A learning set is enhanced by keeping tension at an optimum level. To keep the children alert but not excited, the teacher may employ subject matter that is appealing, use color, light, or movement judiciously, or introduce an occasional element of surprise.

d. The curriculum should be varied but interrelated. Rotate active and passive activities to prevent boredom and fatigue, but relate the activities so that one flows into the next, avoiding a drastic "changing of gears" which the learning disabled child so frequently finds difficult. The overall rhythm of the day's activities should be enhanced by variations in tempo and direction, and the length of the lessons varied according to the capacity of the child at any given time.

e. The teacher must help the child to control his distractability, if this is one of his problems, and for a number of reasons it often is. His distractability can be

as potent and as serious a deterrent to his attempts to learn as it is to the brain-injured child described below:

He finds it impossible to engage in any activity in a concentrated fashion, but is always being led aside from the task at hand by stimuli which should remain extraneous but do not. ... Under these conditions it would be expected that the individual would tend to respond to a variety of extraneous stimuli and lose track of the task at hand (Strauss & Kephart, 1955, p. 135).

A recent study (Martin & Powers, 1966) shows that distractability can be controlled effectively in retarded children with operant conditioning techniques. The child must be "motivated" to attend, using the techniques suggested under motivation above, and given a more limited number of stimuli to which to respond.

f. It will be necessary, as it frequently is in the regular classroom, to control the proximity of the child to the chalkboard, to the teacher, to selected ones of his peers, and to certain distracting but essential stimuli in the classroom.

g. It will be necessary to help the child control his rigidity, if this is a problem for him, because it will probably be beyond his own control.

The child displays rigidity in learning behavior for two reasons.... Whereas the normal child has an intact (nervous) system and can move freely anywhere within this system, this child has a disrupted system which, because of its lack of integration, does not permit him to move. If he gives up one response he has nowhere to go and is left with no possibility of response.

The second reason for his rigidity is psychological. He has attempted many tasks. In a large number of these he has failed because of his learning disorder. As a result of these many experiences he has learned that when he undertakes a new task, his probability of failure increases.... He, therefore, develops a psychological avoidance of change in the interest of reducing his probability of failure (Kephart, 1967, p. 58).

The teacher must simplify his tasks so that the neuromuscular-sensory demands are within the capacity of the child. If he then exhibits rigidity, she must "press against his rigidity (Kephart, 1967, p. 60)," or the child cannot vary his performances enough to learn. She must be firm and not allow the child to escape a task she knows he is capable of performing. She must be consistent--not alternate between being firm on one occasion and yielding on another. She should expect the child to obey. Although she will not allow the child to decide whether or not he will attempt a task, she will respect him as an individual and reinforce (reward) him when he works at overcoming his rigidity.

h. The teacher must be able to distinguish between rigidity, which is specific and task-directed, and frustration, which is shattered behavior and directed toward everything in the immediate environment. When the teacher realized that the child has reached the frustration level, she should reduce her demands and simplify problems confronting the child to the tolerance level.

11. For most of the children, a carefully structured environment will be instrumental in enabling them to control



their reactions. The atmosphere must be calm and well-planned to set an example for patterns of behavior and to reduce distractions.

a. Keep the work area neat. Provide only the materials required for the task at hand.

b.. Be calm. Don't show anger or irritation with the child. Speak softly, so that the child must listen carefully.

c. Set up definite work periods so that the child knows what to expect and when to expect it.

d. Simple commands and directions should be given. Don't talk too much.

e. Be sure the child completely understands what he is being taught. Vary your explanations or demonstrations until you find a way to get through to him.

f. Relate new situations to those the child is familiar with. The old learnings serve as an anchor to make the new ones more definite.

g. Redirect the child if he wanders from the appointed task. "Go back and finish your \_\_\_\_" is more efficacious than "Stop \_\_\_\_."

h. Help the child to structure his task so that he is able to proceed in a step-by-step manner.

i. Limit work periods so that the child can achieve some success before he gets too tired.

j. Controls must be immediate, consistent and ap-

propriate. Timing is all important if the child is to learn to relate cause and effect in his behavior.

k. Control should not acquire a punitive aspect. The child is being limited in the scope of his activities because he can achieve his goals only within such limitations.

12. The initial remedial focus should be on the disability area. The scope of remediation should then be widened to include related disability areas, and then broadened again to integrate the rehabilitated skills with the child's intact areas. Without putting undue strain on the disabled function, the teacher must work with both strong and weak areas to integrate the new learning and to bring the child's abilities into better balance.

13. Just as "man does not live by bread alone," the child's improvement in his ability to achieve academic success is not sufficient to ensure a well-rounded adjustment, although it often helps. If the child is to attain his optimum potential, the teacher must attempt to influence his emotional and social adjustment by wise classroom management and direct personal contact. She can reduce anxiety and tension through reassurance, support and firm guidance, and increase the development of inhibition through reinforcement of controlled behavior (Frostig & Maslow, 1969; Pollack, 1968). She can promote his social development through an emphasis on friendliness, cooperation and mutual respect, helpfulness and order, and use of social reinforcers at opportune times, thus helping to improve his adjustment at school, at home, and in the community (Hewett, 1968).

14. In addition to her professional training, the teacher must have two other qualifications whether her charges have learning deficits or not.

a. She should have a thorough understanding of learning principles so that she does not unknowingly work against herself as did the teacher in the study by Kuypers, Becker, & O'Leary (1968-1969) discussed in Chapter VII. Good intentions are not enough. She must know both what to do and why it is necessary.

b. She should have a genuine interest in her pupils so that they may perceive her as warmly and sincerely concerned about them (Rogers, 1951); otherwise, it will be difficult for her to develop power as a secondary reinforcing agent since many negative cues will also be associated with her. Like Shakespeare, children are aware that a person can "smile and smile, and be a villain still."

#### Theories Proved Efficacious

The principles, methods, and techniques discussed above have evolved from research and actual remediation experience with a large number of children from preschool to high school age, in widely varying locales, and have been found efficacious in educating children with learning disorders where other more classical pedagogical methods had failed.

The Devereux Foundation Schools in Devon, Pennsylvania, and Victoria, Texas (Gonik & Ayers, 1966), the Special Education Department of the Sacramento City Unified School District

of California (Vallett, 1967), the Warren Achievement School of Handicapped Children in Monmouth, Illinois (Ebersole et al, 1968), The Dubnoff School (Dubnoff, 1966), and the Marianne Frostig Center of Educational Therapy, (Frostig, 1964, 1968; Frostig & Maslow, 1969) all report successful remediation using these or similar techniques with children with learning and behavioral disorders. Studies by Lewis (1968), Allen (1967), and Alley (1968) also attest to the value of the Frostig Program. Some more limited methods of remediation, such as the Gillingham system for remedial reading and the Doman-Delacato technique for developing neurological organization have had uneven success. Gillingham (1960) and Kline, Kline, Ashbrenner, & Calkins (1968) report successful remediation using the Gillingham method, but some others have had less success, possibly because the originator is unaware of some of the critical variables she employs and hence has not passed them on (Kephart, 1967). Doman and Delacato (Doman, Delacato, & Doman, 1963; Doman, Spence, Zucman, Delacato, & Doman, 1960) have convinced many anxious parents of the efficacy of their system, but much controversy still surrounds their work (Stern, 1965). The American Academy of Pediatrics (1965), for example, reserves judgment pending successful replication of the Doman-Delacato technique, but advises its membership to remember that there is as yet no firm evidence substantiating the claims made for this technique. Robbins & Glass (1969), in a more recent study, refute the Doman-

Delacato theory on the basis of internal inconsistencies and direct contradiction of established knowledge. "There is no empirical evidence to substantiate the value of either the theory or practice of neurological organization (p. 378)."

#### Controlled Evaluations Required

A survey of the literature has failed to reveal any controlled studies of the various systems for educational remediation other than those in which the disabled child's own history of inadequacy served as the control, and this method leaves a number of variables uncontrolled. For example, the placebo effect affects the individuals' responses even in those extreme cases where they are clearly advised that they are being given placebos (Park & Covi, 1965). It has long been known that the Hawthorne effect works to improve performance in those aware that they are receiving special attention and consideration beyond the norm for their situation, even when the total effect of this consideration is to reduce the adequacy of the environment under which they are operating (Rothe, 1961).

In addition, the Rosenthal effect has recently been shown to operate in favor of the hypothesis held by the experimenter (Rosenthal, 1966). A large number of recent investigations (Rosenthal, 1966) have shown that the expectation of the researcher significantly affects the outcome of his experiments, whether with rats or college sophmores, even though his errors in recording results do not show a

bias in the direction of his expectancy. It is necessary to do very carefully arranged work with double-blind controls in order to eliminate this effect.

It has been shown (Rother, 1961) that reducing sizes of work groups to five or six individuals significantly improves their productivity in an industrial setting. It is, therefore, possible that the factor of group size alone may be an important variable in the success of these remediation strategies, as is the increased opportunity for a one-to-one teaching relationship with the child.

Controlled studies of the efficacy of current educational strategies for the remediation of learning deficits, therefore, are now required, for as Sidman (1960) suggests:

An investigator may, on the basis of experience, have great confidence in the adequacy of his methodology, but other experimenters cannot be expected to share his confidence without convincing evidence (p. 75).

Granted, the necessary controlled studies are fraught with great difficulty. Matching cases at the outset of remediation is open to considerable error, and controlling variables likely to affect the outcome in some way is extremely difficult. Recording data uniformly and judging outcome as it pertains to the great variety of phenomena involved presents a challenge to the serious investigator. Nevertheless, the need is great and the time is propitious.

## CHAPTER IV

### CONTRIBUTIONS FROM THE LABORATORY

#### An Aid to Efficiency in Remediation

The necessity for developing effective methods for remediation of learning disabilities has been considered, but efficacy (validity) is only part of the problem. Because these children are seriously handicapped by their own ineffective and inefficient functioning, there is a desperate need to employ the time, money and human resources available for their education to the best possible advantage. It is particularly essential to avoid the "two steps forward and one step backward" progress that so often characterizes the educational process.

Since the goal of remedial education is the acquisition of new behaviors, such as reading, writing, or working quietly, in the most efficient manner possible, it is expedient to capitalize on the findings made by experimental psychologists in their studies of behavior modification. The principles derived from their labors have been used successfully to teach rats complex problem solving (Brogden, 1951), pigeons to guide bombers (Skinner, 1960), and children to read (Nolen, Kunzelmann, & Haring, 1967-1968).

These principles are valid in every aspect of the environment and may be applied toward the prevention or alteration of maladaptive behavior, the development of personally and socially adaptive characteristics and the improvement of the child's learning processes, per se (Gonik & Ayers, 1966). Like time, they exist and affect us whether we will it or not. It is to the child's benefit that the educator apply them consciously and systematically to advance his own purposes rather than leaving their potent effects to chance. A thorough understanding of learning theory is therefore essential for the effective planning and management of a remedial program.

#### Theory Versus Fact

Although debates still rage concerning the physiological bases of learning, certain empirical findings concerning the acquisition of learning have been replicated countless times and are not contested. If we define learning as "a change in behavior resulting from practice (Kendler, 1963, p. 151)," in order to avoid complicating the discussion with changes in behavior due to developmental phenomena or to physical alterations in the organism, the experimentalists have a rich lode of tested data ready for mining.

#### Gifts From the Laboratory

Some of the discoveries that are most pertinent for increasing efficiency in the educational process are as follows:



While there is increasing evidence suggesting that classical and operant (instrumental) conditioning depend upon the same physiological mechanisms, they will be dealt with separately here for convenience' sake.

In classical conditioning a neutral stimulus is paired in a close temporal relationship with a stimulus (unconditioned) which has the power to evoke a response that is already part of the individual's behavior repertoire. As a result, a response similar to but not identical with that elicited by the unconditioned stimulus comes to be elicited by the neutral (conditioned) stimulus. The neutral stimulus must precede the unconditioned stimulus in the conditioning paradigm.

Instrumental (operant) conditioning differs in that the organism must first emit certain behavior which is then reinforced (rewarded) to increase the probability that this behavior will occur again. The reinforcing event must follow the response in close temporal proximity and be perceived by the organism as a "positive" or desirable contingency.

A conditioned response can be weakened or gradually eliminated by a process known as experimental extinction. The conditioning trials are conducted as usual but are not followed by reinforcement (or the unconditioned stimulus, in the case of classical conditioning), with a resulting progressive decrement in the strength of the conditioned response.

After a brief rest, the organism will show a spontaneous

recovery of the conditioned response. However, the strength of the response will be markedly less than it was before experimental extinction was commenced. After spontaneous recovery has occurred, the conditioned response may be subjected to further extinction trials, allowed to rest, and exposed to still more nonreinforced trials. The conditioned response will eventually disappear completely.

Apparently conditioning occurs to a class of stimuli rather than to one specific stimulus, because the conditioned response can be elicited by stimuli similar to but not identical with the conditioned stimulus (Buch, 1963). The amplitude of the response elicited by a generalized stimulus will be in direct ratio to its similarity to the conditioned stimulus. This phenomenon is known as stimulus generalization.

Response generalization also occurs as the conditioned stimulus may elicit various responses that are similar to but not identical with the conditioned response.

The results of extinction generalize in the same manner. When the tendency of a conditioned stimulus to evoke a response is weakened, the tendency for similar stimuli to elicit the same response is also weakened in proportion to the similarity between the two stimuli.

Conditioned inhibition occurs when a neutral stimulus and a conditioned stimulus are presented together and not reinforced; under these conditions the organism becomes conditioned not to respond.

After a conditioned response has been extinguished, the presentation of an extraneous stimulus may temporarily reinstate it. This is referred to as disinhibition.

Reinforcements which are capable of eliciting a response or which satisfy some need of the organism are called primary reinforcements. The neutral stimuli which have become conditioned stimuli may become rewarding in themselves and are then known as secondary reinforcements. Higher-order conditioning occurs when a conditioned stimulus functions as an "unconditioned stimulus" in setting up a conditioned response to a third (neutral) stimulus.

When an organism becomes aware of any stimulus, it reacts with an orienting reflex involving extensive changes in its physiological state and skeletal posture. With repeated or continual exposure to this stimulus, habituation (a continuing response decrement) occurs in cells, muscle groups, and in the organism as a whole.

A number of variables affect the acquisition and strength of a conditioned response. Since learning involves competition between habits, the strength of the opposing habit or habits is an important factor. It is easier to learn a new response when it is competing with a weak association rather than with a strong one.

Motivation is another important factor in selective learning. The quantity and quality of the reinforcement, as well as the need state of the organism, affect both the la-

tency and the amplitude of the response.

The value of punishment in affecting learning is difficult to assess. Punishment has been proved less effective than experimental extinction in weakening and eliminating an undesirable habit. In fact, punishment seems only to suppress it for a period (Estes, 1944). However, if punishment is applied to an unwanted response at the same time an alternative response is available for which reinforcement can be obtained, learning is greatly facilitated (Whiting & Mowrer, 1943). In addition, punishment suppresses more behavior than may be intended, and if not properly timed can suppress desired behavior rather than the unwanted responses. As a side effect, the aversive emotions aroused by punishment can generalize to other stimuli present at the time of the punishment.

The scheduling of reinforcements affects the speed of acquisition and speed of extinction of a response. The response is learned faster if a reinforcer follows each correct response, but is also extinguished more rapidly under this condition. Extinction proceeds more slowly if reinforcement has been on an intermittent schedule because the organism has learned to persist in the absence of reinforcement.

The strength of a response is a function of the number of times it has been reinforced and of the schedule of reinforcement. Where the schedule is held constant, the strength

of a response is proportionate to the number of times it has been reinforced.

The principles that operate in conditioning simple responses also function in conditioning more complex forms of behavior, a psychological technique known as shaping behavior or simply as shaping (Kendler, 1963). In shaping operant behavior, the first bit of behavior in the chain that leads to the final act is reinforced until it dominates competing responses; then reinforcement is withheld from this behavior and a closer approximation to the desired behavior is reinforced. In this fashion the organism is moved through successive approximations up to the final goal behavior.

As indicated earlier, there is no controversy in scientific circles as to the validity of these principles. While they do not specify any particular goal or the steps required to reach it, they do constantly operate to affect the rate at which the goal is approached. Let us examine, then, some of the remedial systems in operation today for evidence of the educator's use of these principles to improve the efficiency of his particular remedial strategy.

## CHAPTER V

### LEARNING PRINCIPLES IMPLICIT AND EXPLICIT IN REMEDIAL PROGRAMS

As indicated earlier, learning principles are in operation whether the educator is aware of them or not, and the conscious or unconscious use of these principles may add to the effectiveness of a given program if they are used in the proper way or detract from an otherwise valid program if they are not. An examination of some well-known programs will make the point for us.

#### Kephart's Strategy

The following is an excerpt from part of Kephart's (1960) system for developing visual motor perceptual ability in a young child:

He (the child) begins training in reproducing forms with the circle since it is the first form to be produced by the young child. The first problem is to teach the child the circular movement itself. The teacher may describe a circular movement with her hand and arm and ask the child to imitate this movement. If he has trouble doing so, he can touch his finger to the teacher's. As the teacher moves around in the circular motion, the contact of the finger guides the child's arm in a similar movement.

If the child still cannot perform, he may need additional tactual and kinesthetic clues such as those provided by running his finger around a template of a circle. When the child begins to develop an idea of the circular motion, we will want to bring this activity under visual control. Our first approach to this problem involves the use of templates held against the chalkboard. The first

activity at the chalkboard is a continuation of the development of the circular movement pattern discussed above. The template is held firmly against the board by the teacher. The child is asked to place his finger inside the cut-out circle and to run it around the edge of the form. Here he is obtaining tactual and kinesthetic clues to the required movement, as previously described. In addition, he is getting further tactual information from the contact of his finger with the surface of the chalkboard as well as with the edge of the template. The teacher should encourage the child to watch his finger as it runs around the circumference of the circle.

The child is then given a piece of chalk which he is asked to place inside the template. He is then asked to run the chalk around the edge of the template in the same way in which he ran his finger around its edge. This activity results in the drawing of a circle. Here again, the task is made easier by the kinesthetic information provided by the contact of the chalk with the board and with the edges of the template. When a circle is completed in this manner, the template is removed from the board so that the child can see what he has drawn.

At this point we are introducing visual clues which we will later want to make the dominant factors in the child's control of his performance. Therefore, it is very important that at this early stage we begin to call his attention to the visual factors involved. After each attempt, the teacher will therefore remove the template from the board so that the child can see what he has drawn (Kephart, 1960, p. 185-186).

The above quotation is a small segment from Kephart's list of instructions for teaching the child to draw a circle, but it is representative of the whole. The use of learning principles here is implicit rather than explicit. The child obviously gets immediate feedback on the results of his efforts, and given that he wishes to learn the task,

he is thereby reinforced by his success. This system very gradually shapes the child toward the final goal, which is to draw a circle unaided and from memory, reinforcing him at every step by the feeling of success inherent in being able to follow the teacher's instructions in a satisfactory manner. Each step is small enough for him to complete properly and provides the cues pointing to the next step in a path leading directly to the goal. Although it is not so stated, the idea is implied in the instructions that both the intermediate steps and the end point of this learning will generalize to other similar forms and the child will be able to draw ellipses, semicircles, etc., from memory with a minimum of additional instruction.

Elsewhere in his writing (Ebersole, Kephart, & Ebersole, 1968) this author gives advice to teachers which implies an understanding of certain learning principles.

For example, "Be consistent. Don't alternate between giving in to the child and being firm about completing a goal." Following his instruction will help the teacher to extinguish the unadaptive behavior which has previously been established by withholding reinforcement from it and to hasten the acquisition of the new behavior by insisting that the child perform it so that he can be reinforced by whatever contingencies the teacher has set up or are inherent in the completion itself.

"Be kind. But don't gush, over-praise, or overdo your



concern, sympathy and love." The implication is that the child's goal-directed behavior should be adequately rewarded ("Be kind.") and that unsatisfactory or irrelevant responses should not be reinforced ("...don't overpraise.")

"Be sure the child completely understands what he is being taught," may be translated into learning terminology as "The organism must be capable of making the response that is required," and "The organism must first emit certain behavior which is then reinforced to increase the probability that this behavior will occur again."

Teach when the child is well-motivated and ready to work.... The response of the child can be manipulated by the teacher or parent.... Bribes or "rewards" may aid motivation. The "M&M Method" and cards with pretty stickers are well recognized. Eventually, however, motivation for learning should come from desires within the child (Ebersole et al, 1968, p. 23).

This quotation acknowledges the need for reinforcement of desired behavior with primary reinforcements and suggests that completion of reinforced tasks may develop powers as secondary reinforcers. It omits the important message about the proper timing of the reinforcing events or objects.

While the motivation is dependent upon the responses achieved by the child, it is also dependent upon the stimuli presented to him.... Is the ink dark enough? Is the printing clear? Is spacing adequate (Ebersole, et al, 1968,

Here the author indicates an awareness that the organism must be capable of perceiving the stimuli, and, inferentially, of emitting the response appropriate to it.

In addition to being flexible, controls have to be immediate, consistent, and appropriate. Timing is important to help the child to relate cause and effect. It should be remembered that appropriate controls for one child may not be effective with another (Ebersole et al, 1968, p. 27).

Here the author provides an axiom in the lexicon of learning principles. The reinforcing event should follow closely upon the response so that it is perceived as the contingency to that response. It must occur consistently enough to reinforce the desired response and extinguish competing responses which are not reinforced. It must be perceived as desirable by the organism in question.

Punishment is a negative approach to stamp out certain behavior responses which cannot be tolerated. Punishment may be needed to teach immediate responses for the safety of the child. The learning resulting from punishment is in the nature of conditioned-reflex learning, affecting only a small part of total behavior (Ebersole et al, 1968, p. 28).

This paragraph shows an understanding of the function of punishment as a suppressor of ongoing behavior and of its ineffectiveness as a builder of positive responses either through primary learning or via generalization of learning.

It appears that in addition to the validity of his theoretical strategy, some portion of this author's successful employment of his remedial procedures must go to the proper usage of learning principles that are inherent within the system itself and within his instructions to the teachers who implement the system. It is possible, however,

that were these principles explicitly conveyed to the teachers and systematically employed by them that the results of the remediation might be significantly improved and the time and expense required be significantly decreased.

#### The Johnson and Myklebust Method

Let us now consider a portion of the instructions Johnson and Myklebust (1967) give with respect to teaching a child with a generalized deficiency in auditory learning. (The ultimate goal is the acquisition of spoken language or, if this is determined to be beyond his capacity, to understand the meaning of the social sounds in his environment for his own protection.)

The primary task of the teacher is to help the child relate sounds to the proper units of experience, and in so doing perhaps the fundamental instructional principle is simultaneity. It is essential that the auditory stimulus be carefully timed with the experience (Johnson & Myklebust, 1967, p. 68).

The author indicates an awareness of the learning principle that stipulates the close temporal relationship required between the stimulus and the response, the response here being an awareness of the sound and of the source of the sound.

In the initial stages of training, the auditory environment should be structured as much as possible. The classroom should be some distance away from traffic and continuous playground noise. Since these children do not understand sounds, they often do not know which ones to ignore and thus overreact to extraneous noise (p. 68).

In the terminology of learning theory, the authors are saying, "The organism must be capable of perceiving the stimulus."

"As they learn to associate sounds with experience, their responses become more suitable (p. 68)." This translates easily into "The strength of a response is proportionate to the frequency with which it has been reinforced." Here again, however, as with Kephart and his co-authors, it is necessary to assume that the successful response is reinforcing in itself or that the teacher has reinforced it in some unspecified fashion.

The daily classroom routine should be planned so that auditory and non-auditory activities are alternated. Because children with severe auditory receptive disabilities have considerable difficulty in listening, they fatigue easily. They need periods of quiet after working on auditory tasks (Johnson & Myklebust, 1967, p. 69).

This instruction clearly indicates that the authors are aware of the inhibition caused by fatigue and of the need for distributed practice when the learned response involves a physical reaction.

"When a child gives no consistent responses, it is important to begin training by making him aware of sound and no sound (p. 69)." The learning principle here states that the organism must be able to perceive the stimulus.

Toys such as bells, drums, toy pianos, or telephones are used to produce sounds and these are presented in a relatively quiet environment. The teacher shows the child each toy object and encourages him to manipulate it so that he has

an active part in starting and stopping the sound. ... Meanwhile the teacher, with facial animation and gestures, indicates that the child should listen. She might cup her ear and look quizzically each time she hears the sound (p. 69).

This operation involves pairing the sight and sound of the stimulus and the concomitant response--awareness of sound and awareness of the source of the sound--in close temporal proximity with the visual stimuli of the object and the tactual and kinesthetic stimuli resulting from manipulation of the object to produce a sound. The sound is also associated directly with an awareness of the fact that others (the teacher, in this case) hear and react to the stimulus situation also.

Toys should be selected which are attractive both visually and tactually, but it must be made certain that it is not only the tactual or visual experience the child enjoys (p. 69).

This can be expressed as "The organism must perceive the reinforcing event as a positive or desirable contingency, and the organism must be able to perceive the stimulus, i.e., be aware of the sound and the toy as the source of the sound."

The instructions quoted above form only a fragment of the authors' total description of their procedure for remediation of this auditory deficiency, but the remainder are of the same caliber. If their instructions are followed to the letter, those learning principles which are implicit in their system are reasonably certain of being included. There ap-

pears to be less leeway for error or vagary of mood of the teacher to operate to omit them than was the case with Kephart and Ebersole et al. However, Kephart's instructions to teachers appears to indicate more awareness of the effects of learning principles even though they are not stated explicitly.

The comment made with regard to Kephart's system of remediation applies here also: The use of learning principles inherent in the methodology of Johnson and Myklebust operate to the advantage of the system. It is probable, however, that their technique could be significantly improved by the inclusion of learning principles on an explicit and systematic basis.

## CHAPTER VI

### LEARNING PRINCIPLES EXPLICITLY EMPLOYED IN RESIDENTIAL PROGRAMS

Certain residential remedial institutions such as the Dubnoff School (Dubnoff, 1966) and the Devereux Foundation Schools (Gonik & Ayers, 1966) are more aware of the need for the explicit augmentation of the efficiency of their programs by the application of learning principles in their methodology than are the educators discussed in Chapter V.

#### Devereux School Procedures

Let us consider the systems of the Devereux Schools, residential institutions for the treatment of children with severe behavior and/or learning problems that have proved unmanageable in other environments. The Devereux management believes that the therapeutic program prescribed for each child requires the following procedures:

1. A detailed observation and recording of the subject's operant behaviors.
2. Identification of the specific problems in the child's behavior which are to be treated.
3. Scheduling "individual" programs designed to alter the child's behavior, employing primarily reinforcement and extinction (shaping) programs.

4. Providing the personnel responsible for the child's well-being with a pragmatic and highly structured program with which to carry out the desired change.
5. Recognition and control of personal biases and other relevant variables presented by the staff working with the child.
6. Exercising optimal control over the child's environment.
7. A continued re-evaluation and follow-through program of the child's progress in treatment (Conik & Ayers, 1966).

#### Methodological Considerations

The authors also describe some of the methodological problems involved in developing these individual therapeutic programs:

Identification and selection of specific desirable behavior which may be strengthened by the controlled presentation of reinforcement.

Identification and selection of "undesirable" behavior which has to be either (a) eliminated (unlearned, forgotten) by "extinction" processes, (b) replaced by the development and strengthening of specific "acceptable" behaviors which are incompatible in time with the undesirable ones, or (c) the suppression of the undesirable behavior through utilization of aversive, punitive measures.

In view of our knowledge of the long-range social-learning difficulties brought about by the all too common and excessive use of direct punitive measures, the usage of aversive controls in the practice of therapeutic management is never a first choice method. When sanctions are indicated, they are always related to a specific behavioral situation.... The judgment to apply sanctions must always be determined professionally to accomplish specific treatment goals and never as a release to the aggressions of a member of the treatment staff.



In line with what we have just said about punishment, the therapist has to concern himself with the study, identification and selection of effective reinforcers. These have to be specifically suitable for effective management controls for a given individual. Such reinforcers must be readily available for delivery by the various treatment agents in the therapeutic program. Examples of effective reinforcers in common use may include: (a) The expression of approval by an adult, whether expressed by words, a smile, or a pat on the back. (b) Attitudes of peers, either singly or in a group, usually initiated and influenced indirectly by the treatment staff. (c) The direct presentation of tangibles, such as candy, cookies, desserts, or recreational privileges such as attending or participating in sports events.

Last, and indeed all-encompassing, is the therapist's concern with the maximum control of the relevant treatment environment. Here the therapist is also concerned with the anticipation, and minimizing, of interferences in the therapeutic management processes which may be presented by extraneous, often unpredictable, and uncontrollable variables.

The type and degree of control necessary in a given situation depends, of course, on the nature of the presenting problems and the specific goals we wish to attain. Certain limited goals, such as the acquisition of specific skills, may indeed be successfully pursued in adequately well controlled part-time classroom, recreational and tutorial situations (Gonik & Ayers, 1966, p. 174).

### Training the Staff

The management of the program is aware, however, that good intention and "common sense" are not sufficient prerequisites in their staff for the carrying through of these programs. A regular in-service training program is therefore carried on, teaching the rationale underlying the therapeutic intervention and emphasizing the necessity for the cooperation of everyone having contact with the child. The

following ten basic principles of student management are emphasized during the in-service training program:

1. Remember your primary duty and obligation as a member of the Devereux staff is to provide our children with the specific services designed to help them to resolve their difficulties. You will do your best by following closely the treatment program outlined by the professional team for each individual child.

2. In dealing with our children make sure you point out regularly the relationships between a child's action and the outcome of his behavior. This is extremely important in helping the child to learn faster and better necessary adaptive personal and social behaviors.

3. Concentrate on the use of positive reinforcers (rewards) following desirable (personal and/or social adaptive) behavior, or an improvement in the desirable behavior (shaping).

4. Ignore undesirable behavior, thus extinguishing (getting rid of; eliminating) such behavior.

5. Give reinforcement immediately (with as short a delay as possible) following the desirable behavior.

6. Give continuous reinforcement while a child "learns" a certain behavior. Give intermittent (partial) reinforcement to maintain the behavior after it has been established.

7. Reinforce (reward) small improvements in the desired behavior. Gradually build towards a longer, more complicated chain of the desirable (personal and/or social adaptive) behaviors.

8. Give large amounts of reinforcements at first, and then reduce the amount slowly after the behavior is established.

9. Consider the immediate goals of an individual child's progress (as outlined to you by the professional team) before deciding which to reinforce and what to extinguish. Remember, each program should be tailored to fit the present behavior of each individual child and not undertaken on a group basis.

10. When in doubt, consult your supervisor (Gonik & Ayers, 1966, p. 178).

Addendums are then given describing the exact systems for bestowing the reinforcement with regard to timing, combination of tangible and intangible reinforcers, appropriateness for the recipient, and for changing from a continuous reinforcement schedule to a variable one.

### Results

The authors claim that the Devereux system as had excellent results in treating children whose problems had been too severe for other agencies to manage. They indicate, however, that part of the credit goes to the fact that the children are in residence, so that certain environmental agents are not busily extinguishing in the evening behaviors that have been laboriously built up during the school day, and vice versa.

### Learning Principles Employed

It is not necessary, in the case of this school, to point out the fact that certain learning principles are inherent in the educators' remedial system. Those principles are clearly explicit and carefully programmed into the therapeutic management of these children's behavioral and academic problems.

It is obvious that the "professional team" is fully aware of the operant conditioning principles since they plan so minutely what behaviors are to be rewarded or "shaped"

into being and what behaviors are to be extinguished and by what process, i.e., extinction procedures, counterconditioning, or suppression through sanctions (punishment). Care is taken to provide reinforcements that will be perceived as positive by the child in question, and the caliber of the reward and the schedule of reinforcements are arranged to build behaviors as quickly as possible and then to render them resistant to extinction. In addition, they have taken the most important step in making certain that the entire staff, from physicians and psychologists to cooks and custodians, are aware of the principles behind the treatment of the child and are required to adhere to them rigorously.

#### Remedial Strategy Omitted

The article on which this chapter is based gives no details as to the academic programs developed for the children, but if these programs are valid for the disabilities involved, the methodology outlined in the previous pages should operate to make them most efficient.

## CHAPTER VII

### BEHAVIOR MODIFICATION IN THE PUBLIC SCHOOL

Since private classes and residential schools are not available to the majority of children with learning deficits, the help available to them in the public school system is of critical importance--for the children whose future welfare or happiness is at stake and for the society to which they may become assets or liabilities, depending upon the education they receive.

A number of studies have been made to examine the effectiveness of behavior modification techniques in affecting desirable changes in behavior in children with learning disabilities when only the school environment, or a portion thereof, has been controlled. Out of the following studies chosen at random from recent publications, all but one culminated in results upholding the view that the application of learning principles significantly improves the speed of learning, other variables being held constant. The one study with a deviant result has important implications for all who wish to implement a remedial technique with an operant conditioning methodology. The studies with "positive" results have a number of other implications also for the management of remedial education.

### Conditioning Length of Attention Span

Martin and Powers (1966-1967) set up an operant conditioning experiment using as subjects retarded children who had very short attention spans, a condition which is often considered to be a concomitant and unrectifiable part of mental retardation. The authors hypothesized that the length of the attention span could be increased through operant conditioning techniques, and the children were reinforced with food on a continuous schedule for lever pressing. Under this contingency, the children were eventually able to attend for as long as 20 minutes (the duration of each session) and were gradually changed to a fixed ratio whereby every tenth response was reinforced. At this point, one of three types of distracting influences was introduced into the cubicle adjoining each child as he operated the lever. Under all three test conditions, the introduction of the distraction produced a temporary disruption of the stable pattern of responding that was observed under the control conditions. However, the stable pattern was soon recovered, indicating that adaption to the stimuli presented by the distracting influence had occurred.

The authors conclude that task perseverance, or a long attention span, is primarily a function of presenting reinforcement contingent upon attending behavior and allowing incompatible behavior to go unreinforced. A short attention span, on the other hand, is a function of reinforcement of

behaviors that are incompatible with the task at hand and a non-reinforcement of attention behaviors. The implication here for the management of the distractability and short attention span often seen in learning disabled children is obvious.

### Conditioning Reading Behaviors

Haring and Hauck (1968-1969) demonstrated that learning principles incorporated into a remedial reading program can significantly accelerate the progress of disabled readers. Four boys having a retardation of one to four years in reading below their level of achievement in other subjects, progressed in instructional reading levels from one and one-half to four years in a little more than five months. Before the experiment began, a baseline was established on the basis of each child's performance in the regular remedial reading class over a two week period. Tokens were then given for accurate responses and quantity of responses on the same temporal basis that daily acknowledgment of performance had previously been given. The tokens were first exchanged daily for the back-up reinforcers, then gradually changed to a twice-weekly basis. The authors conclude that the development of a systematic procedure of instruction that improves instructional conditions to the point where children who have severe reading disabilities can come to read normally in a rather short period of time is more profitable than any concern with the etiological origin of the problem.

### Conditioning Control Behaviors

Hewett (1968-1969) has demonstrated that children with severe emotional disturbances that are manifested in aggressive and other disruptive behaviors may be helped to control their behavior by specialized reinforcement procedures in the public school system without resort to the total control of a residential institution. The teachers for the two experimental groups were given two weeks training in the rationale and procedures of an operant conditioning system before the experiment began. Aware that emotionally disturbed children are frequently unresponsive to social reinforcements (Quay & Hunt, 1965), the experimenters decided to allow the teacher of the control class to use any non-tangible rewarding system she might choose to examine the effect of tangible versus non-tangible reinforcers for these children. Otherwise, she was to use the school's usual teaching techniques.

The two experimental classes were given checkmarks as tokens and rewarded for improvements in behaviors as well as for meeting absolute standards, and by mid-term far surpassed the control class in the acquisition of control behaviors (attention, responsiveness, order, etc.) and in arithmetic, and equalled it in reading skill. One experimental Group (EC) was then returned to the control condition, i.e., no tangible reinforcers. At the end of the school year, the EC group exceeded the experimental group and both significantly outperformed the control group.



The surprised authors hypothesized that the effects of novelty might have affected the performance of the EC group but discounted this because such effects would have worn off long before the 17 weeks of the second term had ended. They suggested, therefore, that this result might be due to:

...(a) the increased effectiveness of the teachers in these classes to function as secondary social reinforcers due to their semester long association with a success oriented approach using a primary reward system, and (b) the investment made in building competencies at the attention, response, and order levels during the experimental condition which readied the students for participation in a teacher centered, more traditional educational program utilizing exploratory, social, and mastery tasks and rewards (Hewett, 1968-1969, p. 529).

Since, supposedly, the other experimental class was possessed of these advantages as well as the tangible reinforcers, it would seem that some other factor is also operating here. However, regardless of the reason for this unexpected result, the study provides evidence that the use of tangible rewards on a temporary basis does not create a dependence on them for continuing success. On the contrary, it seems that such rewards may be very useful in launching children with behavior and learning problems into successful learning in school.

#### Conditioning Adaptive Behaviors with Premack's Principle

Aware, as were the above authors, that social incentives so often fail to motivate children with learning disabilities, Kunselmann and Haring (1967-1968) arranged a study of

junior high school students having serious learning and behavior disorders. As a test of Premack's concept (1965) that high probability behaviors will reinforce low probability behaviors, the authors conceived of a token system using as back-up reinforcers play periods and a variety of enrichment and practical studies in the school. They also provided for access to the use of slot cars, models, popular recordings and teen magazines on the assumption that such choices would be particularly reinforcing to the students.

The remedial programs were geared to a very precise behavioral diagnosis of each student's presenting problems and were then individually administered within the classroom situation. By the end of the school year, academic and behavioral improvements in this group were so remarkable that the study stimulated wide interest among personnel in surrounding school districts. As a result, similar behavioral management techniques were either under consideration or in practice in those districts by the time the study was published.

The behavior also generalized to the home environments to the extent that parents began requesting conferences to obtain detailed explanations of the techniques of classroom management rather than conferences to discuss the students' functioning.

A surprising finding of this study, and one having implications, perhaps, for those planning to institute such a program was that the students' high-probability choices tend-

ed to be handicrafts, typing, woodworking, organized games or science kits rather than the slot cars, models, recordings, etc. It may therefore be more profitable in such a program to determine the students' high-probability behaviors in advance rather than making the assumption that they will prefer culturally determined reinforcers.

#### Counter-conditioning Disruptive Behaviors

Seventeen nine-year-old children of average and low average intelligence who continually evidence highly disruptive behaviors in the classroom were the subjects of a behavior modification study by O'Leary and Becker (1966-1967) using points as tokens and back-up reinforcers that were tangible. After a period devoted first to accustoming the children to the observers and then to assessing the baseline behavior of the subjects, the children were informed of the experimental contingencies and the requirements were written on the board where they remained for the duration of the study. The tangible reinforcers were provided daily for the first three days, then accumulated for two days before being distributed, for three days and finally for four days, while at the same time the points required for a reinforcer were gradually becoming higher. By requiring more appropriate behavior to receive a prize and increasing the delays of reinforcement, it was hoped that transfer of control from the token reinforcers to the more traditional methods of teacher praise and attention would occur.

As the authors of a similar experiment phrased the same sort of expectation:

Thus, at the same time that reading was being taught, the child was also being taught (a) to work for symbolic rewards (tokens), (b) to delay gratification, and (c) to work on an intermittent reinforcement schedule--three characteristics which must be developed if the emotionally disturbed child is to participate ultimately in a regular school program (Quay, Werry, McQueen, & Sprague, 1965-1966, p. 516).

(While Quay et al are discussing emotionally disturbed children, the "normal" child as well as the child with learning deficits must also acquire these three characteristics if he is to function well in school.)

The teacher in the O'Leary and Becker (1966-1967) experiment was instructed to reinforce each child for approximations to the final desired response--to reinforce evidence of progress--and to comment on the children's good behavior. Deviant behavior was to be ignored, and good behavior to be attended. As a result, the daily mean of deviant behavior during the token procedure ranged from 3 to 33 percent, although it had varied between 66 and 91 per cent during the base period.

In addition to the effects of the reinforcers, two other factors may have added to the "dramatic and abrupt change from the base to the token phase of the demonstration (O'Leary & Becker, 1966-1967, p. 641)." (1) During the baseline and token phase of the demonstration, the teacher was enrolled in a psychology class which emphasized operant and

social learning principles. (2) The reduction in deviant behavior allowed the teacher to spend more time giving children individual attention during the token phase, and she had time to correct and return the children's work immediately, thus giving them prompt feedback. In addition, she was able to devote part of this extra time to the use of teaching materials for which she had not previously had time.

In order to demonstrate that the token system and not some other factor was the causal factor in the children's improved behavior and learning skills, the authors planned to return to base conditions, thereby demonstrating the degree of stimulus control obtained by the technique. However, the return to base conditions was not carried out because of a concern that the enthusiasm and cooperation generated by the program throughout the school system might be severely reduced, since the authors were convinced that "There is little doubt that a return to base conditions following three or four weeks of the token procedure would have resulted in an increase in disruptive behavior (O'Leary & Becker, 1966-1967, p. 641.)"

A planned replication of this study to control for the factor of the teacher's special education and to determine the effects of returning to the base condition eventually provided the data for the study reported as "How to Make A Token System Fail," by Kuypers, Becker and O'Leary (1968-1969).

### "Failure" of the Premack System

An attempt was made by McKenzie, Clark, Wolf, Kothera, and Benson (1967-1968) to modify academic behaviors in ten students of a learning disabilities class, using behaviors presumed to be high-probability activity to reinforce low-probability behavior (see Premack, 1965). The incentives for completing work assignments were permission to use the recess period for play (rather than for finishing incomplete assignments), to eat lunch in the school cafeteria (rather than eating alone in the classroom), or to act as line leaders or run errands for the teacher. This system stabilized at a level of achievement well below the desired level, a finding in direct opposition to that of Nolen et al (1967-1968) discussed above. It seems probable, however, that the contingencies chosen do not permit a valid test of the Premack concept. Since the contingencies used as reinforcements (with the exceptions of privileges such as leading lines or running errands) were events that are the usual right on any child enrolled in a public school system, the net effect of this system of reinforcement was to fail to reward those who succeeded and to punish those who failed, hardly the ideal conditioning contingencies.

### "Success" for the Take-Home Tokens

McKenzie et al then called a conference of the children's parents and arranged for the payment of their allowances to be made on the basis of their grades in school. Each set of

parents determined the amount of allowance for their own child, but the rate was set at ten units for an A, five units for a B, one unit for a C, and a deduction of ten units for an In-complete. The children were to be encouraged to spend their money for "reinforcing" objects or experiences and were not to be allowed to earn money other than enough to pay their parents for any indebtedness they might incur when deductions exceeded their pay for the week. In addition, they were given the "incentives" previously discussed, and the teachers were instructed to comment upon good behavior and to ignore deviant behavior unless it became too disruptive, in which case it was punished.

This system of contingencies now increased the levels of behavior in these highly distractible and disruptive students to an acceptable level. The authors point out, as additional advantages, that it provides for the parents to bear the expense of the back-up reinforcers and saves the teacher valuable time that would otherwise be spent in distributing the reinforcers.

"Where we went wrong was----"

A token system is not a magical procedure to be applied in a mechanical way.... The full set of equipment is needed to do the job right (Kuypers, Becker, & O'Leary, 1968-1969, p. 108).

The authors quoted above titled their study How to Make A Token System Fail. Actually, the results reached a signif-

icant degree of effectiveness, but the authors considered the level reached to be unsatisfactory by their standards. This was to be a replication of the study described earlier (O'Leary & Becker, 1967-1968) and utilized the same general mechanisms. Their report was written to point out to others considering the development of such a program some of the differences between the two studies and some of the errors they feel they made:

1. Tokens were given for meeting an absolute standard rather than for improvement. Shaping was not used. The students who profited, primarily, were those whose behavior initially was less disruptive and who therefore had more opportunity to be reinforced for good behavior.

2. No attempt was made for the teacher to systematically apply differential social reinforcement in between the times when the points were awarded or at other times during the day. They felt that this aspect of the previous program was probably responsible for much of its effectiveness, and that points awarded 30 or 40 minutes later are not enough to help a child learn more appropriate behavior.

With effective and continuous use of praise for good behavior and ignoring of deviant behavior, immediate consequences can be brought to bear on such behavior, especially when praise has been made important to the children through its pairing with tokens. The authors feel that the lack of generalization effects are probably due to this difference



in procedures.

3. Observations of the teacher during the day indicated that she would intermittently pay attention to deviant behaviors and would often ignore the children when they were behaving well. If paying attention is reinforcing and if ignoring is tantamount to extinction procedures, the teacher's actions would be affecting the children in a way directly opposite to that intended.

4. The teacher was not trained in the systematic application of behavior principles. Such training may be important in knowing how to shape behavior and how to use differential social reinforcement effectively.

5. Another potential problem was that the teacher was much more lenient in her interpretation of deviant behavior than were the authors, so that in making judgments about following the rules her frame of reference tended to foster the reinforcement of deviant behavior, as defined in the study, and to leave the level of improvement at a low ebb.

6. The study provided irritants to the teacher which caused her to refuse to proceed further, although she did relent and allow them to examine the effects of withdrawing the token system for four days. Specific annoyances to her were the behaviors of two of the observers who were not replaced soon enough despite her complaints about them, and the experimenters' intrusions on her evening and week-end time to discuss problems. They, therefore, feel that great

care should be exercised in selecting and training observers in providing guidelines for the supervisory staff, and in preparing the teacher for what is coming.

### Replies to the Critics

Though picked at random from recent literature, as previously noted, these studies refute, both separately and collectively, complaints made about token or other operant conditioning systems being used in remedial education programs.

To the contention that learning principles do not apply to children with learning disabilities because they do not learn in the same manner as normal children--as testified to by their classification--the investigations above stand in refutation. Their subjects were mentally retarded, emotionally disturbed, or possessed of behavioral and/or academic disabilities. None were undertaken with "normal" children.

Another frequently voiced objection refers to the supposed dependence on tangible reinforcements in perpetuity.

The fears of those who would predict that children given tangible rewards in school for learning would have to be followed around for the rest of their lives and immediately rewarded with candy for each task they accomplish are completely unfounded.

As the child learns to pay attention, respond, follow directions, explore his environment, obtain status as an accepted member of a peer group in the classroom and master the basic academic essentials, he becomes a ready candidate for reintegration.... The true value of the engineered classroom seems to be that in this totally unique environment where successes are guaranteed and small units of accomplishment are

continuously acknowledged on an immediate and concrete basis, the child gains confidence and ability, and rather than regressing, he begins to progress, in some cases for the first time in several years (Hewett, 1969, p. 440).

This conviction may be shared by Nolen et al (1967-1968), Haring and Hauck, (1968-1969), O'Leary and Becker (1966-1967), and Hewett (1967-1969), all of whom found that the improved behaviors generalized to other classes, to the home environment or to both, and that it could be sustained later in regular classrooms.

To the complaint that use of tokens robs teachers of valuable time and is an unnecessary expense to the school system, O'Leary and Becker and Nolen et al might reply that the time involved for dispersing the tokens and tangible reinforcers is amply provided by the improved behaviors of the children. McKenzie et al have also shown that the time and money required for the back-up reinforcers can be provided by parents.

### Conclusion

All of these investigations, including the "failure" of Kuypers et al, prove that the use of operant conditioning principles in working with learning disabled children saves time, because the children learn so much faster,--saves money because fewer years of school expense are required to bring the child to his potential level of achievement,--and, most important of all, saves children, because they gain in ability, in self respect and in emotional adjustment. It is truly parsimonious.

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