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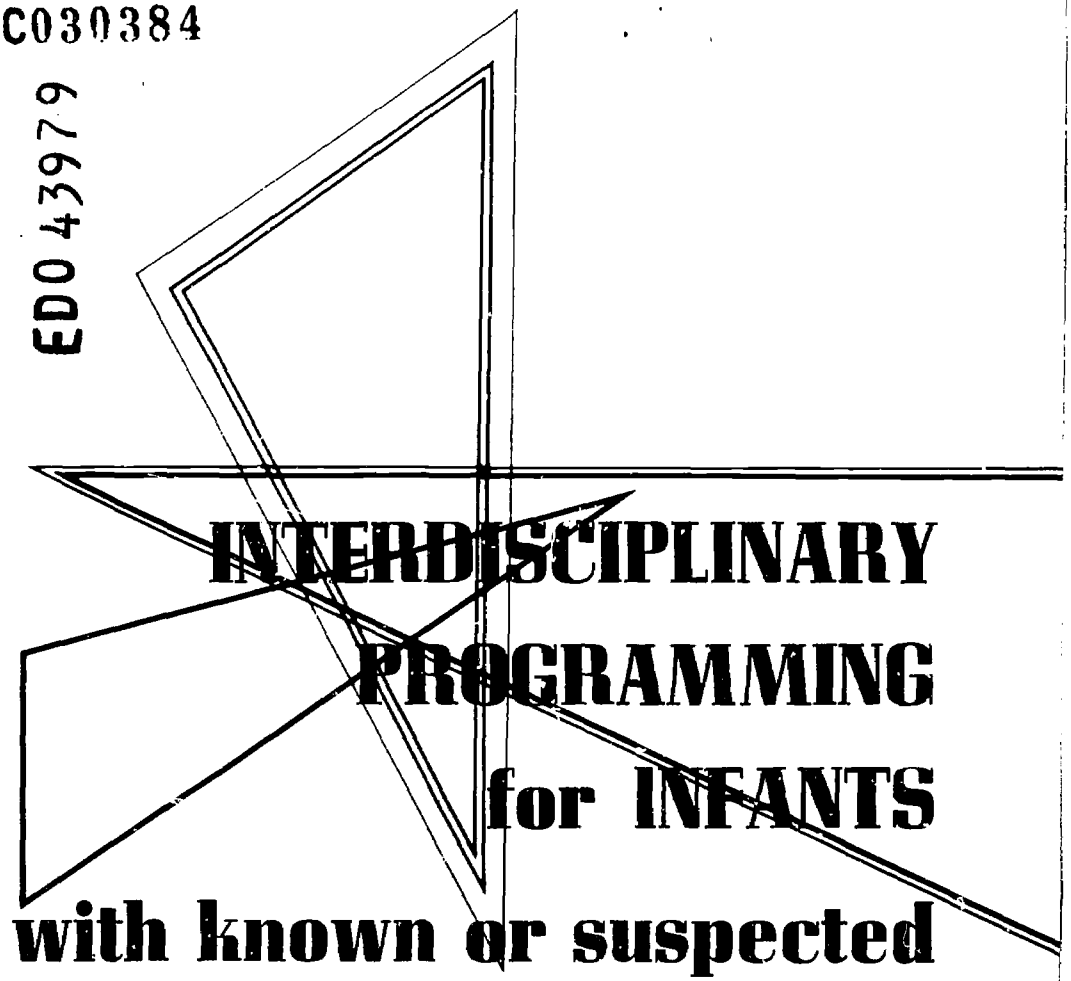
ABSTRACT

The report of an interdisciplinary conference held at Santa Monica, California (March 16-18, 1970), contains papers on interdisciplinary programing for infants with known or suspected cerebral dysfunction. Following a general overview by R. R. Rembolt, a description of the Meeting Street School Home Developmental Guidance Program (Providence, Rhode Island) is presented by Eric Denhoff and others; Margaret Jones provides a program profile for infants and young children with physical handicaps, and Halbert Robinson examines the implications which cognitive research holds for early care. The psychologist's role in programing for such infants is suggested by C. R. Strother, while Frances Connor presents a curriculum concept for the very young handicapped child. Reports of the discussion groups include guidelines for educational programs and their implementations for infants with cerebral dysfunction. (RD)



INTERDISCIPLINARY PROGRAMMING for INFANTS with known or suspected CEREBRAL DYSFUNCTION

Western Interstate Commission for Higher Education

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INTERDISCIPLINARY PROGRAMMING FOR INFANTS WITH KNOWN OR SUSPECTED CEREBRAL DYSFUNCTION

The report of an interdisciplinary conference held
at Santa Monica, California, March 16-18, 1970

Edited by
Gene Hensley, Ph.D., and Virginia W. Patterson

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PREFACE

For the past five years (1965-70) a program of regional coordination and development in the field of Special Education and Rehabilitation has been sponsored by a joint grant from the United Cerebral Palsy Research and Educational Foundation and the Federal government. Many mutual interests have been pursued during this period. In 1970, United Cerebral Palsy's Task Force on Early Care turned to WICHE for help with some special concerns about the adequacy of current services for infants under two years of age who have suspect or known cerebral dysfunction or a definitive cerebral palsy. Assistance was requested to help find answers to the following questions.

It is known that very rapid learning takes place in the first two years of life and that much of this learning takes place on a neurosensory and neuromuscular basis. Therefore, if an infant has cerebral dysfunction which impairs neurosensory and neuromuscular capacities, what type of service does he need from a "learning" point of view to make the best possible use of what he has left? How can his remaining capacity for learning be enhanced? How can services along these lines be made available to babies during their first weeks and months, as well as later in life? What type of a "curriculum" would be appropriate for such infants during their first two years?

It is equally well known that an adverse environment can hinder a child from attaining his full capacity for learning. Brazelton and others have pointed out that families attempting to cope with the multiple needs of infants who deviate from the normal are frequently subjected to significant stress. As a consequence, a family which might otherwise provide a very supportive environment for normal infants may have great difficulty in doing so on behalf of a handicapped baby. What help do such family members need in order that they may enhance the baby's potential for learning and also meet his other multiple needs during infancy?

What are the manpower needs for services which include a focus upon the cognitive or learning aspects, as well as the other parameters of habilitation?

With these factors in mind, the Early Care Task Force of United Cerebral Palsy Associations, Inc., undertook a study of services currently available for such infants and their families and found that very few facilities directed much attention to the cognitive or learning aspects of development in children under two years of age.

While there was evidence that some facilities had broadened the

basic, strictly medical surveillance to an interprofessional approach, including representatives from one or more other fields such as therapy, nursing, or social service, there were only a handful of programs in which the early childhood educator or cognitive psychologists were being utilized.

Some of these programs which included a focus on learning were outside the immediate geographic area covered by WICHE. In order to have the benefit of these experts' advice, UCPA and WICHE undertook a joint project to bring a representative group together for a work-conference held in Los Angeles in March 1970, with the following objectives:

- to identify the role of the early childhood educator and/or cognitive psychologist, as a team member in programs of this type;
- to develop a series of guidelines which would be helpful to those interested in developing a curriculum appropriate for use with such infants;
- to suggest avenues whereby educational programs for these infants and their families can be implemented on the state and local level; and
- to identify the manpower needs and suggest some avenues for preparing personnel to staff such services.

These proceedings are being made available to all affiliates of United Cerebral Palsy Associations. However, it was felt that there would be many others interested in the excellent papers as well as the guidelines resulting from these deliberations. Consequently, UCPA and WICHE have again collaborated to print a sufficient number of copies for a broader distribution.

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INTERDISCIPLINARY PROGRAMMING FOR INFANTS WITH KNOWN OR SUSPECTED CEREBRAL DYSFUNCTION

PROGRAMMING FOR INFANTS WITH CEREBRAL DYSFUNCTION: AN OVERVIEW

R. R. Rembolt, M.D.

SIGNIFICANCE OF CONFERENCE

Few assignments have been more demanding than to try to focus attention on some of the more significant information relative to the subject at hand. Fairly well recognized is the intricacy of the process of infant development itself (1). Compounding the complexity occurs from adding the consideration of the infant with cerebral dysfunction. Active concern with the problem of cerebral dysfunction in infancy constitutes a relatively new emphasis, with the exception of some of those participating in this conference. There is far from exhaustive scientific data on the subject from which to be guided. In certain aspects conflicting information exists presently. Although multidisciplinary programs are relatively commonplace, the implications of *interdisciplinary* functioning in programs have not been elucidated sufficiently to distinguish them firmly. This is a most important conference not only because it is probably the first of its scope, but because some of the important information expected to result from it is in great demand for practical application.

WHAT IS A PROGRAM?

What is the meaning of "program"? Is it as meaningless as Dr. Martin Bax (4) suggests in a personal communication? He says, "Incidentally, I'm suggesting 'programme' as 1970's most overworked and meaningless word." Frequently, this appears to be the true situation. Dictionary definition indicates program is ". . . a plan of procedure." However, for consideration here it must have broader connotation.

Trantow (3) has outlined more comprehensive implications of the term "program," from an article by Deniston *et al.* (4). Program is ". . . an organized response to reduce or eliminate one or more problems." Included in this response are three qualifications: "1) specification of one or more objectives, 2) selection and performance of one or more activities, and 3) acquisition and use of resources."

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In order to permit subsequent evaluation, statements of subobjectives must specify the following: "1) *what*—the nature of the situation or condition to be attained, 2) *extent*—the quantity or amount of the situation or condition to be attained, 3) *who*—the particular group of people or portion of the environment in which attainment is desired, 4) *where*—the geographic area of the program, and 5) *when*—the time at or by which the desired situation or condition is intended to exist."

Major Assumptions

At least two very important major assumptions must be a part of every program plan: "1) the assumption that use of resources as planned will result in the performance of planned activity and 2) the assumption that the performance of planned activity will result in the attainment of the desired objectives."

Thus, a given program compared to another may vary considerably in several respects. 1) It may be simple or complex; for example, a particular problem may be a small one or it may constitute a segment of a larger question. 2) It may be broad or limited in scope. Probably the relatively well-known collaborative study of national scope is a noteworthy example of one that is a broad program as well as being complex. 3) There may be numerous important objectives or relatively few. 4) Many or few personnel may be required to accomplish the objectives. 5) Involvement of the required personnel in the program may be considerable or limited. Or, possibly the anticipated time and effort expected of persons involved in the program may vary from one to another. 6) Obviously, the expected geographical area may be narrow or widespread. 7) One program may be planned for a short period of time and another for a long duration. 8) Financial means to support the program may be great or minimal. 9) Basic assumptions relative to the program may be sound or shallow. Other variables than those just set forth can exist.

Further important considerations must be a part of an optimally effective program. It is apparent that good direction and coordination must be an integral aspect of the program in view of the multifaceted aspects. A means for periodic and continuing assessment of the program is a necessity for several reasons, but especially for justifying its operation, for making improvements where needed, and for redefining necessary measures for accomplishing objectives. Conceivably, as the program progresses there may be new developments which make necessary certain changes in original objectives or in other respects.

The planning for effective direction and coordination of the program

is of great importance. On these considerations rests the success of the program to a great degree. Many competencies are required of the director of a program for the infant who has cerebral dysfunction in addition to the professional skills one in that capacity might possess. 1) He should have broad general knowledge about cerebral dysfunction, infant development, the expertise of those disciplines represented in the program, and parental reaction to their involved child as well as to the program being undertaken. 2) He should be ever mindful of the need for appropriate intercommunication between all disciplines concerned with the program and must promote its accomplishment on a continuing basis. 3) He should foster cooperation in regard to all aspects of the program being undertaken.

Cooperation More Than Word

The implications of *cooperation* seem appropriate for greater consideration here since programming for it becomes necessary if it is to be used most effectively (5, 6). Unfortunately, the meaning of the word is too often assumed rather than contemplated. Several basic principles apply to the optimal use of cooperation in a program:

1) Participants must have a desire to cooperate. However, more than desire is needed because undoubtedly cooperation is a learned process in which techniques and methods are developed from experience. Accordingly, it seems that probably all individuals are born neutral regarding cooperation.

2) Participants must realize that cooperation is work. There is doubtful conservation of energy involved when cooperation replaces individual effort. However, when cooperative effort is successful, the cumulative success is expected to be greater and more rewarding than the success which would have come to each individual if he had invested his energy alone. Furthermore, cooperation requires learning, and learning is work. Accordingly, when a cooperative effort is attempted, there should be planning for the extra work involved.

3) Participants in a cooperative effort must have some needs in common. There is nothing about which to cooperate if common interest, objectives, resources, or other bonds do not exist.

4) Participants in a cooperative effort must each have some resources to contribute. The resources may be money, manpower, know-how, or something else. Regardless of what it is, each must have some contribution to share.

5) Adequate communication between participants is of special importance. Techniques and principles which are developed through co-

operative effort — learning — result from communication. What each participant has to give and what each expects to receive from his cooperative effort become common knowledge through communication. Common goals and the means for their achievement become known through communication to all concerned in the cooperative effort.

6) A final principle is that cooperation is a tool and not a goal. It is a means whereby an end may be achieved, but it is not the end in itself.

INTERDISCIPLINARY APPROACH

One of the major emphases at this conference pertains to interdisciplinary aspects of programming. This is most appropriate since it is increasingly realized that in the diagnosis and management of children who have such entities as cerebral palsy, cerebral dysfunction, and others, more than one professional person is frequently required to meet their needs.

In a recent presentation Dr. Holt of London has enumerated three major situations where "Group approaches are particularly useful . . ." for those children who have cerebral palsy. Successful group approach may occur:

1) when grouping of professional workers occurs ". . . in order to achieve satisfactory diagnosis, assessment, and management";

2) when grouping of children is arranged ". . . to facilitate their care and treatment";

3) when grouping of the ". . . parents of the children" takes place.

The frequent need for a group professional approach in management rather than an individual professional approach seems indicated under the following circumstances:

1) To give appropriate attention to multiple defects affecting vision, hearing, intelligence, speech, and personality, in addition to other disabilities.

2) To assure specialist coverage as is often required from the audiologist, ophthalmologist, neurologist, psychologist, special educator, psychiatrist, orthopedist, and other experts.

3) To provide a continuum of care which may involve various agencies or organizations at different times and yet maintain an integrated program.

According to the foregoing, the need seems undeniable for programming in order to accomplish the group professional approach in

those with cerebral palsy and in those with certain other cerebral dysfunction. When such approach is used appropriately, reasonable expectation is that it will be effective, if the child's condition warrants an optimistic outlook. However, by qualifying the approach as to its appropriateness, further clarification is needed. The point of issue pertains to the difference between a "multidisciplinary" operation or one that is "interdisciplinary."

Integration of Findings Is Essential

It is evident that a group professional approach could function on a "multidisciplinary" basis and yet not be "interdisciplinary" in nature. Such "multidisciplinary" approach accepts the need for multiple consultations. In such a situation arrangements are made for their accomplishment in a conveyor belt fashion with the child going from one consultation to the next. This ensures that nothing is missed — except the most important aspect of all! Such omission is " . . . the most *essential* part of all assessment schemes, namely, the integration of all the findings and their interpretation in terms of the child's needs." This "multidisciplinary" functioning constitutes an inflexible arrangement which, particularly in older children, often creates a further confused child and parent. Each professional worker may be unaware of the actions and recommendations of his colleagues. This lack of communication reduces the opportunities for each involved professional to expand his understanding of all significant aberrations in the child and minimizes his ability to coordinate specific endeavors towards an objective which should be shared by all.

The preferred "interdisciplinary" approach is based on the realization that the affected child may require services from multiple specialty areas, and the specialists concerned need to exchange ideas among themselves. An improved and coordinated attention to meet the child's needs is fostered. However, two cautionary statements are worthy of mention relative to the "interdisciplinary" program: 1) When the child is the center of multiple and sometimes simultaneous examinations, he may become swamped by the system. 2) Due to the strong emphasis on interprofessional communication, care must be exercised to prevent so much interprofessional communication that less constructive work is accomplished with the involved child.

Thus far, some of the various mechanical components necessary in evolving a program have been presented along with suggesting the need for providing adequate guidance in implementing the program and the implications of effective interdisciplinary action on a cooperative basis.

THE PINE SCHOOL PROJECT

Probably the first preschool program (even before Head Start) to attempt to improve the intellectual functioning of culturally deprived children was the Pine School Project at the Universty of Iowa, which operated during 1957-1962 (7). It seems important at this time not only since it was the first one, but also because of the nature of its program with young children, the results obtained, and the utilization of home economists in the interdisciplinary program. The inclusion of a home economist is not commonplace in such programming for children with cerebral dysfunction.

Briefly, the project consisted of selecting a group of "deprived" children between three and six years, determining their intellectual level, providing them with a preschool program, improving their nutrient intake, involving the parents in guidance sessions (8, 9, 10) and reevaluating the children to determine the occurrence of possible changes.

Criteria for the selection of children were as follows: 1) Chronological age was between three and six years. 2) The intelligence quotient, according to Stanford-Binet testing, was expected to fall within the range of 50 to 80. 3) The presence of physical and neurological involvement, as assessed by a pediatrician, made the child unacceptable. 4) Evidence of mental retardation was to be present in at least one other member of the family. 5) The parents were to be in the lower socioeconomic status group, as determined by a modified Warner Index of Status Characteristics.

Interestingly, intelligence test scores were available from 19 parents of the 20 families involved. The range of I.Q. levels in these parents was from 53 to 108. Three of the parents were at the level of 70 I.Q. or below; five were between 71 and 81 I.Q. levels; five were between 81 and 91 I.Q.; and six were above an I.Q. of 90.

The program was housed in a barracks which made it possible to have two classrooms. A full-time teacher was assigned to each room. In addition, assistants and student teachers participated when they were available and could be utilized. Two social workers functioned in the project on a part-time basis. Others performed as staff but had other commitments within the University except for the two teachers who were employed on a full-time basis. The general health of the children was under the supervision of a public health nurse. A home economist served as consultant in home management.

The program was multifaceted, including nutritional attention to the child, a preschool program, counseling with parents, and fostering group meetings of the parents. That part of the program which was

nutritional in nature included offering the children milk three times a day and providing a high protein, low carbohydrate lunch while attending preschool. The educational portion of emphasis in the preschool setting consisted of an attempt to provide broad experiences typical for middle-class children. That aspect dealing with parents consisted of the home economist consultant, assisted by the public health nurse, conducting group meetings with the mothers twice monthly. The emphasis at these meetings pertained to homemaking and child rearing. In addition to the meetings, individual home visits were made frequently to help the mother with marketing, establishing budgets, and in receiving other guidance. In addition, the project established monthly parents' meetings.

Developing Sense of Belonging

The results of this project involved both parents and child. One of the feelings characterizing these parents early was that of loneliness. Accordingly, a lack of parental participation was usual for group activities of any kind. However, a sense of "belongingness" difficult to document developed slowly in these parents as the project proceeded. A second favorable effect on the parents was that 16 of the 20 families moved at least once during the project, and 14 of the 16 moves resulted in procurement of larger and more modern homes. Although initially these parents evidenced hostility, frustration, feelings of rejection, awareness of social inadequacy, and resultant dependency, they gradually became more comfortable with most of the staff people. Furthermore, the parents' opportunity to clarify their feelings and to secure information which modified their attitudes and child-rearing practices was most gratifying.

Of great interest is the effect of this project on the intelligence quotient of the children who were in the program. Twenty-seven of the children in the project for at least one year had a net mean gain in intelligence quotient of 14.3. Eighteen of the children who continued in the project through the second year evidenced a net mean gain of 15.9 points in their intelligence quotient. In these 18 children, the net gain from the first to the second year was 3.5 I.Q. points, which is not significant. Accordingly, the major gain in intelligence quotient occurred during the first year as demonstrated by these children who were in the Pine School for at least two years.

Another significant result of the project is reflected in the school placement and obvious educational accomplishment of these children. Sixteen of the 27 entered regular school classes upon their discharge from the Pine School Project. Interestingly, nine of these 16 were in the upper of three reading groups within the regular school classes

in 1962. Six children were enrolled in special education classes for the educable mentally retarded upon their emergence from the project. Three children were thought to need special classes, but since their families moved to school districts without special classes for the mentally retarded, they attended regular classes with an adjusted program. One child who moved from the project area in the first year was subsequently admitted to a residential treatment center for disturbed children.

The significance of the Pine School Project to programming for infants with cerebral dysfunction seems to have closer relationships than might initially be apparent. In some respects, problems in the family relationship are not appreciably different when the child is culturally deprived or mentally retarded, as compared to one having other cerebral dysfunction. Personal experience emphasizes the apprehensions, misapprehensions, loneliness, frustration, awareness of inadequacy, feelings of rejection, and dependency inherent in many parents of children with cerebral palsy or other apparent cerebral dysfunction. It seems that many mothers of these children are not only faced with the concerns about their infant's dysfunction but with the continuing need to function in a homemaking role for the rest of the family as well. Not infrequently, particularly in the new parent, the mother's obligations as a wife and mother deteriorate when she is also faced with the responsibility of managing an aberrant child. Accordingly, frequent guidance as was provided by a social worker, home economist, and public health worker in the Pine School Project seems to have great applicability in programming for the infant with cerebral dysfunction.

Early Assumptions

In further consideration of the Pine School Project and its results, one could suggest that some of the assumptions that existed when programming was being developed for this project seem to be as follows: (1) That at least some children suffered from some dietary lacks and gained improved functioning through essential nutrient intake including milk three times a day at the preschool. (2) That some of the children's obvious retardation was of a type that would improve under more favorable home environment and preschool environment. (3) That parents of these children could be helped by appropriate guidance in home management including budgeting, marketing, and in other ways and thus become more stable. (4) That through friendly guidance in homemaking and a demonstrated interest in them the parents would be more receptive to help for their own betterment and thus be of greater help to their children.

"EARLY CARE" SERVICES FOR YOUNG CHILDREN: SURVEY OF MEMBERS OF THE AMERICAN ACADEMY FOR CEREBRAL PALSY

A survey was undertaken by the author to determine the extent of participation of members of the American Academy for Cerebral Palsy in "Early Care" services during 1969.

Methods. A relatively simple inquiry was developed and mailed to all Academy members as a questionnaire. Simplicity of this instrument was considered important, hopefully to enhance the number and objectivity of the responses. Information was sought in six different aspects for the year 1969: 1) Was the member professionally involved with an organized interdisciplinary activity of care for children under two years of age who had known or suspected cerebral dysfunction or definite cerebral palsy, either singly or combined? 2) What was a reasonable estimate of the number of children involved in such an activity? 3) What disciplines were represented in the group which actively provided such a service? 4) What was the professional field of the director of the service program? 5) How frequently was an enrolled child participating in the organized activity? 6) Was the service residential in nature or not?

The questionnaire was so constructed that most responses could be made by inserting appropriate entries in specified blank spaces. In addition, the respondent had an opportunity to add any comments. In several ways an attempt was made, especially on the query sheet and in an accompanying brief instructional page, to emphasize that data being sought pertained to those children under two years of age receiving services in 1969.

The term "program" had broad implications as intended in the questionnaire and as essentially all respondents seemed to interpret it. It might include the identifying of potential patients with possible brain dysfunction or cerebral palsy, diagnostic evaluations, and management services including follow-up and guidance for home care, either singly or combined.

Results. Returns were received from 372 respondents of the 588 Academy members (Table I). This constituted a 69 percent yield from questionnaires originally mailed. Further evidence of representative returns from the Academy membership is that they came from 19 of the 23 specialty categories. Only six of the total returns were without an entry to any of the questions. In many instances, additional comments were included. Accompanying reprints of articles and other printed material were also submitted by some and pertained to

programs concerned with the responses. In this manner, it was concluded that a minimum of 246 members — over 40 percent of the membership of the American Academy for Cerebral Palsy — were involved in services for possible "brain damaged" children under two years of age during 1969.

Table I. Scope of survey, returns, and involvement with programs

		No.
AACP* members surveyed		588
Returns	63.4%	373
United States	340	
Foreign	27	
Questionnaires without entries	6	
Involvement with "Early Care" programs		
Yes		246
No		121

*American Academy for Cerebral Palsy

The geographical scope of this survey was broad (Table II). Not included in Table II are those states from which fewer than nine service activities were reported, of which there were 33. Only one interdisciplinary service was indicated by respondents from each of the states of Delaware, Hawaii, Idaho, New Mexico, South Dakota, Vermont, and Wyoming. The number of children per multidisciplinary service program for the year, as reported, was preponderantly under 50 and more generally less than 25. Figure 1 indicates the range in

Table II. Geographic source of responses to questionnaire

United States	No.	Foreign	No.
New York	40	Canada	8
California	32	England	6
Michigan	16	Sweden	2
Texas	16	Denmark	2
Illinois	14	Scotland	2
Florida	12	Argentina	1
Missouri	12	Czechoslovakia	1
Pennsylvania	12	Holland	1
Louisiana	10	Israel	1
Minnesota	10	Italy	1
Virginia	10	New South Wales	1
Massachusetts	9	Norway	1
		West Germany	

Those with 8 or fewer: All states except Maine, Montana, New Hampshire, North Dakota, Utah, and Wisconsin

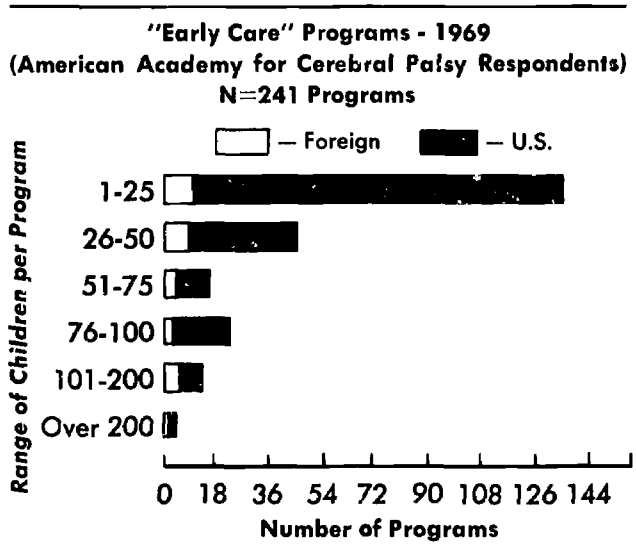

Figure 1. For the most part, smaller sized groups of children were enrolled in the greatest number of specific programs.

number of children per program. From one facility, the Children's Medical Center at Boston, estimated contacts were with 1500 young children who were brain damaged or suspects in 1969. However, also suggested was that the majority was seen for diagnosis and surgery. Obvious in considering all returns, a segment of the respondents were involved with more than one service activity of the nature being surveyed. Thus, the reported number of children by a given respondent in some instances reflected a total of those seen in several places.

Of possible surprising interest was the number of organized service activities in which many and varied professional personnel were involved (Figure 2). In six instances there was only one profession involved. Thus, these activities did not constitute a "multidisciplinary" approach. However, in all other programs reported, there were from two to ten people from different disciplines implicated. It is noteworthy that in 106 organized programs, eight, nine, or ten different professional areas were a part of the operation. For purposes of this analysis, when multiple medical specialists were involved in the program, tabulation of such was entered only once and that under the "medical" category. Table III recounts the nature of specialty services available in these programs and lists the number of programs in which a particular profession was a part of the interdisciplinary approach to

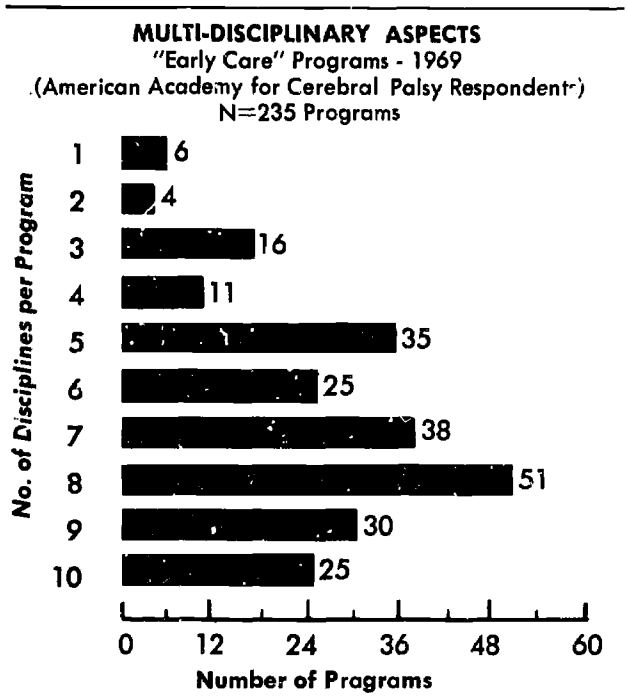

Figure 2. Indicated is the number of varied disciplines utilized per program reported. N - 235 programs

Table III. Professions involved in "Early Care" programs

Profession	No.
Medical	232
Physical Therapy	225
Speech and Audiology	212
Social Work	187
Occupational Therapy	186
Psychology	173
Education	160
Nursing (RN)	134
Child Development	124
Practical Nurse	58

Table IV. Professional background of program directors. N - 205

Profession	No.
Medical	177
Education	7
Physical Therapy	6
Speech and/or Audiology	5
Psychology	4
Social Work	3
Occupational Therapy	3
Others - Administration, Physical Education, Electroencephalography, Crippled Children's Service, & University Teaching Center	

the young child with cerebral dysfunction. Table III indicates a sizeable majority (over 85 percent) of the programs reported herein were directed by one in the medical profession. This is possibly not unexpected since the background and special interest of most of those reporting was medical. Even so, directors of the service activities represented are in 12 different professional areas.

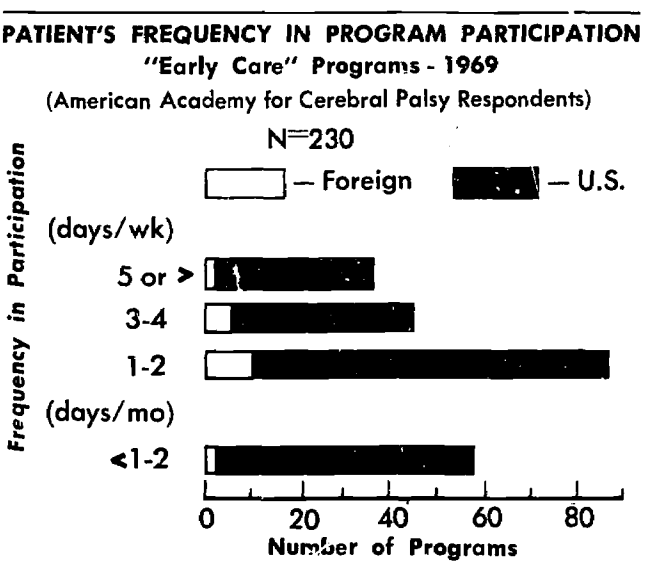

Figure 3. The most common frequency of a child's participation in a program is 1-2 days per week, both in the United States and in foreign countries.

The frequency of participation of children in organized service programs is reflected in Figure 3. The most frequent participation of the child was for one to two days per week. Nearly 75 percent of all enrolled children were participating from daily contact to at least once weekly.

Strongly preponderant were nonresidential type programs according to responses relative to the nature of the program (Table V). Medical centers and university programs more commonly were those indicated as providing both residential and nonresidential services.

Table V. Residential status. N - 228

	Foreign	U.S.	Total
Nonresidential	13	155	168
Residential & nonresidential	6	26	32
Residential	4	24	28

Eight programs, which have been included in data just presented, were characterized by no indication of a physician being a part of the interdisciplinary program. Two of these were located in Illinois and one each in Florida, New York, North Carolina, Ohio, Oregon, and Tennessee. One program included up to 40 children in 1969, but each of the remaining programs had fewer than 20 children enrolled — one had fewer than ten and another had fewer than five. One program was mainly the assessment of visual and auditory acuity in neonates by use of electroencephalography (11, 12). Each of these service activities except two involved teachers (Table VI). One program involved pedodontics plus social work, psychology, nursing, physical therapy, and occupational therapy. Five of these activities functioned several days weekly, but less frequently than every week day. Educators or speech therapists directed each of the programs except in two instances. One of the two was administered by a social worker and the other by a physical therapist.

Table VI. Professional Staff in nonmedical programs. N - 8

Professions	No.
Education	6
Physical Therapy	5
Speech	5
Social Work	5
Occupational Therapy	4
Child Development	3
Psychology	3
Pedodontics	1
Audiology	1
Electroencephalography	1

DISCUSSION

The complexity of fetal and infant development is a well known fact and not a new concept (1). However, its importance cannot be overemphasized due to a variety of events which, although seeming to be minor in nature, cause serious alterations in development and lead to subsequent abnormal functioning. These detrimental influences may take place during prenatal periods, at birth, or in infancy — especially as it concerns cerebral functioning. Furthermore, the manifestation of dysfunction and the intensity may be considerably varied from child to child. This state of affairs cannot be overlooked as it relates to programming for those with cerebral dysfunction.

Another important consideration has to do with the uncertainty in predicting the course of the manifestations in many young children who seem to have cerebral dysfunction. Solomons, Holden, and Denhoff vividly demonstrated this in a prospective study (13). Numerous examinations were conducted on 795 children in the first year of life, followed by reassessment at three years. A sequence of examinations was given in the fields of pediatrics, pediatric neurology, psychology, and child development. Fourteen children were originally found to be deficient on at least two examinations in the first year and only one received treatment over the several year period of evaluation. Twelve of these children were reassessed completely at three years of age with the following results: Four of five infants with spastic hemiplegia at less than one year of age were completely free of it between the second and third year; four of seven infants without cerebral palsy, but with delayed development prior to one year of age, were "normal" by the third year.

The question about existence of critical periods controlling cognitive development still seems to continue without firm answer (14, 15, 16). Obviously an answer is pertinent to programming. Some supporters of the concept advise varied approaches in management which may include strong emphasis on motor activities, presenting novel and varied means of providing general sensory stimulation, and other approaches. Some data pertains to animal experimentation, other comes from observations in older children, and less from study of infants. The undetermined and possibly inconstant causative role of cerebral dysfunction infants, viz., genetic factors, malnutrition, cultural deprivation, adverse parent-child relationships, anoxia, and other variables, seems to increase the magnitude of the problem, probably due to different accompanying manifestations in the child.

Effect of Nutrition

The role of nutrition prenatally and in early infancy is gaining in-

creased attention relative to brain development (17). Prenatal malnutrition may lead to small-for-age babies, prematurity, toxemia, or may possibly have a direct influence on brain growth itself. Even nutritional experiences of the potential mother before conception may be extremely important to subsequent intrauterine fetal growth (18). It seems well established that "hypoglycemia" in the first week of life is another important cause of brain damage but which can be prevented by timely treatment (19).

Effect of Rh Sensitization

A very favorable development in relatively recent years pertains to the baby destined to suffer from the effects of Rh sensitization in the mother. For many years exchange blood transfusions for the involved baby were the most effective measures to undertake. Later, transfusing the baby in utero was found to be effective when the mother's sensitization had occurred. Now, clinical studies are well along pertaining to prevention of sensitization in Rh negative women with the use of anti-Rh immune globulin (Rho GAM) given to the mother. Results from these clinical trials are highly favorable. Thus, it seems that reduction of cerebral palsy and other cerebral dysfunction caused by Rh incompatability may be effected by judicious use of these measures. However, the Rh sensitized mother who fails to have prenatal care or first seeks it near term is not appreciably better off than she has been in the past 20 years.

Reducing Incidence & Severity

There has been increased interest in and improved care of high-risk infants in the past several years. Such measures of management include advances in infant feeding, better monitoring of heart and respiratory functioning, improved oxygen administration, betterment of intensive care units for infants, earlier alertness to potential problems, special transportation measures for care of sick infants (20), and other provisions. Hopefully, these and other advances may reduce the incidence or severity of cerebral dysfunction. On the other hand, more babies saved may result in more with cerebral dysfunction to some extent.

"Fetel medicine is a new but rapidly growing subject" (21). Impetus in this area has occurred due to rapid developments in amniocentesis and cytogenetics. "Programs have been instituted for the detection of genetic disorders in the neonatal period with the hope that early diagnosis and therapy might significantly modify the natural history of the disease. In galactosemia, maple syrup urine disease, and adrenogenital syndrome, early diagnosis and treatment may be life-saving. In other conditions, such as phenylketonuria, early diagnos-

is and treatment may be responsible for decreasing the degree of mental deficiency" (22).

Another interesting development reported in the past year is the use of "sonar" or "ultrasonic echo sounding" as a means of studying prenatal development. Its utilization has no presently known hazards to the fetus and "The patient experiences no discomfort from the ultrasonic beam." By its use, it is possible to study the development of the fetus ". . . from the earliest weeks of pregnancy until delivery." Among other possible determinations of some interest at least somewhat related to the subject under consideration is the ability to measure the development of the fetal head during the second half of pregnancy. Also signs can become objective in indicating failure of normal intrauterine rate of growth. Seemingly this is only the beginning of developing more complete methods of studying intrauterine growth.

Just mentioned, and only in a cursory fashion, have been a few selected reports related to cerebral dysfunction in infancy, or some means of early study of the possibility of its presence. These and other similar data that might have been presented in greater detail contribute only indirectly to programming for infants with cerebral dysfunction. A program designed for prevention of the disorder in infancy would be especially concerned with these data.

Medical Orientation Noted

In further consideration of programs for infants it seems that a significant number are medically oriented, especially as reflected by the survey of the members of the American Academy for Cerebral Palsy. Gratifying is the realization that many varied disciplines are involved in these programs. However, certain events transpiring in the provision of medical services are under way which have important implications in program development.

Generally speaking, there continues to be a migration of physicians to cities and a decrease in their numbers in rural and other less populated areas. Furthermore, there is an ongoing tendency for physicians to specialize. Recently, in program planning for training physicians there is the inclusion of measures hopefully designed to prepare more family physicians. Program development for infants with cerebral dysfunction, accordingly, will necessarily need to be guided by these trends.

Another possibly remote aspect, pertinent to programming for infants with cerebral dysfunction, relates to what is being done to help future physicians to acquire abilities to accomplish more effective evaluation and management of the child with cerebral palsy as well as to function in an interdisciplinary manner.

Medicol Students Need Added Exposure to Handicapped

Dr. J. William Hillman, immediate past president, American Academy for Cerebral Palsy, included a consideration of physician training in his presidential address (23). He focused especially on medical students and residents in regard to their exposure to cerebral palsy and its related aspects. He indicated that medical students: 1) are entering medical school with a stronger basic science background than formerly; 2) are respectful of the clinician, but are expecting him to "be scientifically correct"; 3) are "demanding and getting earlier contact with patients"; and 4) are filled with "new and identifiable concern about the complexities of delivery of specialized care services."

Residents in some specialty fields, e.g., orthopedics, are expected on Board examination to demonstrate only a ". . . minimal competence in cerebral palsy." One resident indicated further that it seemed that the senior staff was having enough of a struggle with keeping the team on the road that he had decided to learn the things he might be doing himself in the future and leave the rest to the team.

Returns from another recent survey conducted by the author have further emphasized the need for better training of medical students. Information was sought from alumni of the University of Iowa about the current usefulness to them of any exposure they had at the University Hospital School when they were University of Iowa students. Many of the replies from practicing physicians indicated, in effect, that their contact in this program for handicapped children was too brief; it should have provided more practical involvement with handicapped children, and greater exposure in all areas of the program would be desirable. Some suggested that at the time of their student days they had no idea that they might subsequently become involved with local programs of care.

What is stated pertaining to medical students is also probably applicable to others of this interdisciplinary group. Experience in functioning commendably in an interdisciplinary setting is especially likely to have been inadequate.

UCP Establishes Task Force

In the past year, United Cerebral Palsy Associations, Inc., has established a Task Force pertaining to "Prevention and Early Care" as it concerns brain dysfunction. Its objectives are to accumulate, review comprehensively, and disseminate the scientific and public education literature relative to "high-risk" mothers and "suspect" or "vulnerable" infants, to foster a national conference on "Prevention and Early Care," possibly much like this one, and to work cooperatively

for more effective awareness and management practices in states and communities.

SUMMARY

The surface has scarcely been touched in presenting an overview of programming for infants with cerebral dysfunction. A program based on planned activity will achieve desired objectives for better than an unplanned, random response program.

The Pine School Project, relatively a pioneering project with culturally deprived children who tested in the mentally retarded range, is an example of fairly comprehensive programming at a time when certain assumptions that were made were less well established than they are now. Uniqueness of the program was enhanced by using a home economist on its interdisciplinary staff, by providing better essential nutrition for the child while he was attending preschool, and by fostering individual and group parental guidance in homemaking and economic aspects.

Report of a survey of the American Academy for Cerebral Palsy indicated a significant number of members who are involved in programs for infants with cerebral dysfunction or cerebral palsy, either singly or combined, both in the United States and outside. A report (24) of visits made to several foreign countries in 1968 suggests that programs have become more flexible in those countries, and there is a greater "national commitment to services for handicapped children" (25).

Certain "breakthroughs" are occurring in respect to availability of knowledge in certain areas pertaining to cerebral dysfunction, but many more are needed. It appears that especially within the past several years there have been more scientific papers generated regarding infant development and aberrations thereof, than at any other comparable period.

One of the very favorable developments in this conference is that consideration is being given to a development stage of the child's condition, rather than to his categorical disease itself.

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THE MEETING STREET SCHOOL HOME DEVELOPMENTAL GUIDANCE PROGRAM: A BEACON FOR FUTURE EARLY EDUCATIONAL METHODS

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LEARNING ABILITY OF NEWBORN QUITE SOPHISTICATED

The learning ability of newborn infants between the first few days and early weeks has finally been documented by psychologists after many years of speculation (13). The exact mechanisms of many learning processes are still unclear, but it is apparent that babies are much more sophisticated at birth than we had suspected. Their powers of perceiving are far more acute than we have recognized, and they increase rapidly in the early weeks, especially if they receive appropriate and structured stimulation. Until now we have not known how to look for their capabilities.

Adverse perinatal stress factors such as jaundice, dysmaturity, and respiratory distress can distort the learning processes and produce bizarre behaviorisms. Clinically these may be shown as excess startle, tremors, hypersensitivity to sound, or poor sucking and swallowing. Thus from day one, the stressed baby is falling behind his normal counterpart. Experience has suggested that very early attention to correction of symptoms by a systematic approach of sensorimotor stimulation can help establish more normal patterns, even in the presence of overt neuromotor disability, while babies who are left untreated eventually emerge as children with hyperkinetic behavior and/or school learning difficulty with or without obvious handicap.

Handicap Identifiable Early

We can now identify handicapped children from stress and outcome profiles at five days of age and confirm their disability by one year. Since perinatal stress does contribute to later behavioral and cognitive distress in many cases, why do we wait an interminable period to start remediation, when it is now possible to initiate correction in the early weeks of life? (14)

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OUR PLANNED APPROACH TO INFANT NEEDS

The Meeting Street School Home Developmental Guidance Program is an example of a planned approach to fulfill the total needs of infants and toddlers over the early developmental period. It is a method which offers a way to modify the effects of behavioral and cognitive limitations. Based upon an experience with young children within the spectrum of cerebral palsy, we feel that the program offers an opportunity to neutralize the adverse effects of a variety of allied disorders by stimulating perceptual, communicative, and cognitive abilities early through a variety of practical home devices and exercises.

The Meeting Street School Home Developmental Guidance Program has been designed over a 15-year period to help compensate for professional and parent unrest with standard management methods for cerebral palsied infants and young children (1, 2, 3). It has been built on a foundation of realism, but is surrounded by a nidus of nurturance and maturation. The basis for the management program is that nurturance in the early years significantly helps lagging maturational processes to unfold cognitive related potentialities, especially when advantage is taken of genetically directed critical emergence periods.

The primordium of the Home Developmental Guidance Program is not original, but the embellishments are. The impetus was provided by McGraw's studies in 1943 when the various movement phases that made up a developmental sequence were described (4). The value of exercise at the time of a critical emergence period was stressed. Gesell and his co-workers expanded the concept of stimulating developmental sequences into a broad behavioral and learning theme which became the cornerstone of the Meeting Street School Program (5, 6, 7, 8). Piaget has reinforced the use of early stimulation by stressing the importance of early sensorimotor intactness on later congitive development (9). Many others have added substance to the program by their emphasis of the benefits of early physical, sensory, and motor activity and movement upon the developing child (10, 11, 12). Child development specialists have enriched it with their early learning theories and techniques (13). The theoretical and practical basis for handling crippled infants and toddlers has emerged from such philosophies.

Input Before Output

The essence of the program has been the ability to select and integrate particular components from many disciplines and fit them to the needs of an individual child. A basic assumption underlying the program is that input is necessary before output can be expected.

Definitions: *Maturation* is the natural process through which a child grows to attain stable adulthood. While growth and developmental changes inherently stem from genetic predisposition, the rate of change may be heavily influenced by environmental interactions.

Critical periods are genetically directed times when specific developmental skills emerge. Individual differences generally fit within an overall standard pattern of emergence.

Nurturance implies techniques of nourishment, encouragement, and support applied during maturation. The methods used are both general and specific and come about by interaction between the family and professionals. Nurturance helps to reinforce maturation.

Early Developmental Tasks are major developmental accomplishments during the first four years which are crucial to effective function. Examples of early developmental tasks are stabilization of vital functions, the eating of solid foods, the ability to communicate, and social development.

Developmental milestones are strategic yardsticks to measure developmental progress, such as walking or talking (15).

The evolvement of the Home Developmental Guidance Program has been an exciting exploration of developmental and cognitive possibilities when organized structure is imposed upon the deviant maturational processes of neurologically handicapped babies.

Specific Techniques

The Home Developmental Guidance Program concentrates on providing developmental stimulation to multihandicapped babies and toddlers through an individualized family-oriented program. It is geared to strengthen "elementary" skills such as walking, eating, and talking and tries to stimulate pre-academic aptitudes. It emphasizes as wide a range of sensory experiences as possible to help the baby learn to process, categorize, and respond to the world around him. It identifies behavior style and helps the parents to build a program around it; it helps set the stage for the school experience.

To achieve these goals, a developmental stimulation team is used in interchangeable roles to analyze the baby's needs, to develop them, and to demonstrate methods to acquire them to parents. The idea is to *catch a developmental set of behavior attitudes at a critical period and to exercise it from a pre-readiness state through skillfulness without neglecting to maintain the efficiency of skills already achieved.* The challenge is to *anticipate the emergence of the next set and prepare for it.*

The program starts with an initial assessment followed by a once-a-month meeting. Thereafter, programming is adjusted on a continuum. If progress approximates normal, the toddler is discharged to a normal nursery school. When it is limited we increase the Home Developmental Program to twice a week and ultimately to a full five-day week. The preschool program emerges with reading, writing, and arithmetic readiness as the ultimate goal.

Babies who fail to make progress are provided with a five-mornings-a-week program over a six-month period. Persistent failure often is related to serious intellectual depression. These children may be transferred to a sustaining day care program with continual supervision and instruction provided by our staff.

Detailed instructions are given to parents at the monthly visit by each therapist involved in a specific area of need. Together they interweave the developmental functions into an integrated and unified approach. The social service team and the physician stand at each end of the family unit to provide solace, support, and specialized attention. Under the guidance of trained personnel, a carefully programmed sequence of developmental stimulation is provided.

A NEW LOOK

Now we are ready to apply techniques used successfully with crippled children to the infant and toddler population with suspect backgrounds, either perinatal, environmental, or culturally deprived. Generally such a child with a perinatal stress history behaves similarly to the cerebral palsied in the early months. He has a distinct chance of developing unacceptable behavior and immature learning habits within early school years because of disorganized information processing skills and the hyperkinetic impulse disorder. Culturally deprived infants particularly are candidates for information-processing disorders. We can afford no longer the luxury of sustaining such children at substandard levels if they are capable of better. Our increasingly complex society with its demands for sustained high level performance forces us to find ways to maximize the abilities of such individuals who can be called psychoneurologically inefficient.

The genesis of school failure in lower-class children occurs during the first two years. There is a lessened mother-child interaction in this population which contributes significantly to later depressed language and expression. Perpetually impoverished living conditions contribute to weak motivation and expectancy for failure. When all aspects are coupled, an awesome difference in language and number competency is found as compared to a middle-class population.

It is our intent to suggest that, with the aid of a "crisis" team, the Home Developmental Guidance Program can be reinforced and expanded to combat effectively the psychoneurological inefficiencies which lead to later learning and behavior problems associated with neontal salvage, family breakdown, and poverty. While the importance of genetic endowment and the limitations imposed by brain damage is recognized, our experiences with cerebral palsied children suggest that many impaired children (but not all) can improve function when exposed to environmental stimulation at the proper time, with the proper attitude, and the proper tools. The method best suited for success is a comprehensive integrated sensorimotor-perceptual-language-behavioral program to help improve information-processing skills. The family must be included in the planning and the carrying out of procedures (3). The challenge will be to see if we can translate the cerebral palsy "bag of tricks" into a meaningful curriculum for preschool children who are "suspect" for later failure. Whether such a multifaceted stimulation program enhances cognitive development can be answered only by a careful documentation of results.

THEORETICAL FRAMEWORK

Is there a relationship between body control, efficient sensorimotor skills, perceptual alertness, scholastic aptitude, and cognitive development? In cerebral palsy, we think so, but have no clear cut proof (14). Piaget's sensorimotor-perceptual requirements to learning have provided the needed fuel for us to continue our efforts to further explore and evaluate our ideas (15). To put theory into practice requires an extension of the Home Developmental Guidance Program into the preschool years. We are doing this.

The infant program encourages developmental milestones to emerge in a fashion to help a clumsy child compete with faster-moving peers. Barriers to progress are handled through standard medical, surgical, and psychiatric techniques. The toddler and preschool program is more sophisticated since it tries to incorporate the special deficiencies of these neurologically impaired youngsters (each has different combinations of problems) into the school curriculum for normal children.

We use an "Information Processing Model" based upon the psycholinguistic model of Osgood (20, 21) to accomplish our goals. We clearly establish the need to stimulate and blend simultaneously and/or coordinately the three basic modalities which we believe contribute to early learning efficiency and cognitive development: 1) body awareness (sensory) and body control (motor), 2) visual-perceptual-motor skill, and 3) language efficiency. These modalities are con-

sidered in the light of intake, integration, and output. Stimulation techniques are devised to incorporate each modality into an overall management picture. When totality planning is adhered to, information of increasing complexity can flow from one modality to another without interference. Depending upon the individual requirements of the child, emphasis may be placed more upon one modality than another but the multidimensional aspects are never lost. *In essence*, at the preschool level, emphasis is placed upon cross-modality experiences although special attention is paid to specific aspects of inefficiency (18). To help the toddler acquire good body awareness and control requires a dissection and analysis into the intake-integrative-output aspects and appropriate stimulation to areas of weakness and areas of strength.

Body awareness and control. Movement is the cornerstone to independence. Body awareness and body control are the sensory and motor aspects of movement. Efficient movement depends upon the base of support, the center of gravity, balance, strength, and body architecture. Physical therapy and education specialists are encouraged to develop this foundation providing the techniques are incorporated within the total plan and not used in isolation.

The ability to handle tactile-kinesthetic clues, visual information, and auditory data are intake aspects. To combine, coordinate, and blend into motor planning is an *integrative* function. To take the information and translate it into output or increasing complex motor skills is the final requirement. It is clear that each aspect does not require a specific treatment; often therapy to other areas will have an override upon the intake-integration-output aspects of body awareness and control.

Special activities are provided to encourage motor skill maturity. Early, the parents are shown how to provide assistive movements, such as body tossing, hand walking, swinging, bowling, and other group activities. Techniques to help acquire body control against gravity follow, as do methods to help improve movement in relationship to objects and self, and self in relationship to others. Here the physical therapist provides the preschool teacher with techniques which encourage: 1) an awareness of one's own body parts, 2) an awareness of the spatial characteristics of the environment, and 3) how to function within a closed space with specific spatial arrangements. Such a curriculum employs: 1) *cross-modality* activities such as "circle" games, 2) *composite body* awareness and control activities which include "animal walks," games with chairs, and rope games, and 3) specific skill activities such as skipping, jumping, or skating. Movement activities are constantly encouraged and refined. In the nursery class an obstacle

course would be used to refine assisted movement, games like "Simon Says" used to help spatial concepts, locomotor patterns utilized to reinforce forces of gravity exercises, and "target" activities planned to relate to movements related to moveable objects.

Visual-Perceptual-Motor Skills. Everyone recognizes that an intact visual-perceptual system is an asset to the child who is entering school. However, there is much disagreement over the handling of an immature system. In most psychoneurologically inefficient children with normal intelligence, it is the motor aspect that is impaired. However, generally there is a gradual improvement in the ability to copy the various geometric designs between seven and twelve years of age. The problem is that the curriculum will not wait for the slow maturer to develop.

It is our experience that the earlier one provides structure to the inefficient visual-perceptual-motor aspect of the information processing system, the better the outlook for ultimate remediation. The Home Developmental Guidance Program provides for such early stimulation but it treats simultaneously other aspects which comprise information processing.

The intake-integration-output concept also can be applied to the visual-perceptual-motor modality. Vision is intake, motor planning is integration, and the motor aspect is output. The visual aspect can be complicated by such items as acuity, strabismus, nystagmus, or astigmatism. It is especially in these areas that there is much controversy as to methods of treatment.

We have demonstrated how we can impose structure upon a perceptually handicapped child. We use a spectrum of activities which starts at a primitive level, following a flashlight in a darkened room, then tracking a bright target, and finally tracing symbols on a sandpapered, textured paper. We feel these techniques have a favorable effect upon cognitive development.

Language Efficiency

There is a high relationship between speech and language efficiency and intelligence and emotional adjustment. Very early clues of dysfunction are failure to babble, early feeding problems, lack of or poor responsiveness to sound, and heightened or inappropriate reaction to auditory stimuli. Many of such deficiencies will be brought to a head between 18 and 36 months, often as lack of recognizable sounds or words or garbled speech. Between 24 and 36 months, a child with a language problem may show a widening gap between motor performance and speech-language skills. At this time, the

speech and language therapist differentiates between disorders of intake (understanding), integration (meshing thoughts into ideas), and output (verbal expression). Awareness to sounds and verbal cues, consistency in following directions and responding to the spoken order are included in the diagnostic evaluation. A treatment plan is developed around the diagnosis and functional level. Parents are instructed in ways to make speech fun. Speech failures are minimized, and parents are shown how to provide successful communication through other modalities, while the therapists help nature to untangle distorted speech and language patterns. Early, much emphasis is given to a variety of noisemakers to help develop sound-object association. Later the child is taught how to select meaningful cues from a variety of background noises. Success, in large measure, depends upon setting up good language models.

BARRIERS TO PROGRESS

In cerebral palsy, barriers to progress emerge in relationship to brain damage. Critical periods are delayed or never clearly appear, and maturation unfolds slowly and unevenly. In marginal babies, clear relationships to later lags may be lacking at first glance. However, we now have evidence to point out that perinatal morbidity contributes to psychoneurological inefficiency at seven years (14). Consequently, a large number of these stressed babies have been shown to develop learning difficulty.

If such babies are prone to school failure, why hesitate to enroll them in a Home Developmental Guidance Program which concentrates on trying to minimize precursor inefficiencies. Complacency often leads to unacceptable behavior patterns and school difficulty.

We are convinced that by providing cerebral palsied infants measures of orderliness, we have helped their ultimate adjustment. We are enticed with the idea that the same structuring may have similar implications for the clumsy infant (20). The Home Developmental Guidance Program offers a unique and practical avenue to approach the problems of culturally deprived infant population (21).

Requirements For Development

To convert the Meeting Street School Home Developmental Guidance Program into a nationwide instrument is a massive proposal. It will require:

1) reorientation of the usual roles and goals of therapists and teachers;

2) concentration upon training child development specialists and aides; and

3) audiovisual training aids for physicians, therapists, and parents.

Imaginative yet functional toys and tools need to be developed to carry out the cross-modality activities so necessary to early stimulation. Other ingredients shall emerge as we apply the program within a community plan.

CONCLUSIONS AND SUMMARY

The Meeting Street School Home Developmental Guidance Program is a comprehensive plan of developmental guidance which is designed to encourage maturation, especially at critical periods. A variety of techniques has been devised which encourages developmental progress. When there are barriers to progress, medical and surgical methods are used to modify the reasons for the delay.

The Home Developmental Guidance Program concentrates upon body awareness and control, visual-perceptual-motor skills, and language, in a cross-modality fashion. We believe that scholastic success in the early years is dependent upon these modalities. The program offers a unique opportunity to incorporate family guidance within the framework of child care.

We are convinced that providing cerebral palsied infants with measures of orderliness will help their cognitive development and ultimate adjustment. It is possible that the same structuring may have similar implications for clumsy or socially deprived infants.

The total living environment must be used to foster a baby's development. Techniques which permit a handicapped baby to receive the same sensory stimuli, motor activity, and social interaction as normal babies are essential. This implies that management programs must be moved out of the hospital clinics into the kitchen and living room.

No one discipline is capable of doing the total developmental job. Also, there are too few sophisticated personnel in any of the specialties. We must train together to produce child development specialists who are team oriented. Training devices to teach the professionals, the parents, and the patient are essential requirements if we are to gain control over the future direction of all children.

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A PROGRAM PROFILE FOR INFANTS AND YOUNG CHILDREN WITH PHYSICAL HANDICAPS

Margaret H. Jones, M.D.

This discussion is concerned with the management of infants and young children with known or suspect central nervous system and/or sensory deficits.

I. PROGRAMS FOR INFANTS WITH PHYSICAL HANDICAPS

Infants to be included in this discussion fall into one of two categories. Either they have evidence of greater or lesser degree of physical handicap from the time of birth, or they show delay in psychomotor development in infancy. In the former group, in addition to appropriate studies of the cause, degree and extent of the deficits and any possible specific remedial measures, management involves symptomatic treatment of the remaining problems. In addition to treatment of the child, assistance is essential for the mother in helping her to understand and to cope with the unusual problems presented. In the second group, infants who were thought to be normal at birth and in early infancy, the child may be recognized to be abnormal before the type, degree, and extent of the abnormality can be diagnosed or a cause determined (30).

During this period of uncertainty, the parents need support in the handling of the child and specific suggestions as to symptomatic treatment which aims, as far as possible, to help the child to compensate for the deficit(s) present. In the overall psychomotor development of the infant, three factors appear to be involved: first, the child himself; second, the mother and environmental factors; and third, the interaction between the first two (35). "What counts most in the learning situation of early infancy and in the mutual adaption of infant to mother is not only the inborn characteristics of the infant or the mother, but how they each manage to fit together or how they do not fit together" (10).

In the case of an infant with central nervous system and/or sensory deficit(s) a crisis time occurs when the parents first come to realize the significance of the situation presented. The physician is faced with a difficult problem in terms of accurate information about the natural history of the condition presented by the child. His prognosis frequently has to be a guarded one (48).

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Shere and Kastenbaum have studied, longitudinally, mother-child interactions in such situations. The results clearly indicate the importance of counseling in regard to the overall development of the child with a physical handicap (51). Without such counseling, emphasis is placed on the physical problem only and insufficient attention given to learning and development in cognitive areas. In the past, therapists — physical, occupational, and speech — have been the main, if not the only, professional personnel involved in the training of infants and young children with physical handicaps. However, in many, if not most, cases the services of a medical or psychiatric social consultant, beginning at the time the diagnosis is first suspected or definitely made, may be of utmost importance in the development of optimal mother-child relationships. Kagan states, "Mother-child relationships, important for the normal child, may be more crucial for the infant with a physical handicap" (36). Further emphasis of the importance of early management of the prematurely born child is given by Drillien's studies indicating that, in personality development and as a cause of behavior disorders, the quality of maternal handling and the very early environment of the child are more significant than the complications of pregnancy, length of gestation, or birth weight (17, 54).

Behavioral Qualities Similar

It may be anticipated that children with physical handicaps will show behavioral qualities similar to those found in normal children. Biologically-based differences, which have been identified by two to three months of age in infancy, have been shown to be identified also at subsequent age periods in infancy and childhood. Nine categories of behavioral qualities have been described as follows: activity level, rhythmicity, approach-withdrawal, adaptability, intensity of reaction, threshold of responsiveness, quality of mood, distractability, attention span, and persistence (11).

In the case of the child with a physical handicap, there may be very great difficulty in determining how much of any behavior pattern is related to sensorimotor difficulty, how much to the particular behavioral characteristics of the individual child. The social worker needs to work very closely with the therapy staff and also with the physician in the overall analysis of the individual child's problems and plan of management. Consultation with the social worker is to be recommended prior to initiation of a specific therapy program by the physical, occupational, or speech therapist. The public health nurse, if available, should be included in the treatment plan.

North Carolina Study

A pilot study for the care and management of cerebral palsied in-

fants from birth to 30 months has been in operation in North Carolina since 1963 (4). This program includes simple suggestions to the mother for holding the baby; for feeding; for helping the infant to get the thumb out of the palm by use of a very tiny thumb splint; by manipulating the wrist to extend the fingers; by offering play objects with a variety of textures, sizes, shapes, and weights; by using a blanket on which the baby rolls from one side to the other with the aid of the parents who alternate in lifting opposite ends of the blanket; and other activities aiming to develop eye-hand coordination, discrimination of sounds, and so forth. Home programs, thus planned and supervised by a therapist, together with parents' club meetings regularly scheduled for discussion of various problems related to such children, have resulted in real improvement not only in mother-child relationship, but also in child development.

Maturation Delayed

The child with a delay in motor development frequently shows distortion of the normal sequence of maturation of development and righting reflexes (47).* Especially in the training of young children who present such developmental delays, the so-called neurodevelopmental or neurophysiological approach, as described by Bobath (5) and Finnie (19), has appeared to many workers to be useful. Köng reports a one to four year follow-up of 69 children treated in this way from early infancy and believes that her results justify the procedures used (38). Documentation of improvement in sensorimotor development as a result of training techniques applied in early infancy is difficult to obtain. Various authors, Köng (37), Fisarova (20), Motzcka (42, 43), Blumenthal (4), Francis-Williams (21), present such evidence as is available to them, indicating improvement if therapy is begun in infancy. Until more evidence is available regarding the efficacy of intervention, initiation of treatment programs, as outlined above, beginning as soon as delay in psychomotor development is determined, is recommended. Without intervention, del Munda *et al.* (16), in a careful neurological follow-up study, report that about half of their study infants with abnormalities in the newborn period were abnormal at one year of age.

In the past, relatively little attention has been paid to detailed evaluation of the oral pharyngeal area and breathing patterns in young infants except in cases of possible tracheo-esophageal fistula. Recently objective recording of nutritive and non-nutritive sucking has shown to differentiate the very young normal infant from the one with co-

*Also, see diagram in the Appendix to this volume, showing the research findings of Harriet E. Gillette, M.D. Page 97.

ordination defect in the oral pharyngeal area (57). Ingram quotes Drillien who indicates that disturbances of feeding behavior in the neonatal period are among the most common symptoms to be found in infants who will later show mental retardation or cerebral palsy (29). Ingram has studied the rooting, lip, and swallowing reflexes and found them to vary in ease of illicitation in normal healthy babies when they were tested at different times. On this basis he feels that their diagnostic significance is limited. He does, however, believe that observation of spontaneous feeding behavior is very important since it reflects the integration of the various feeding reflexes and their coordination with other activities of the child. He states, "The feeding situation also provides a situation in which the child is faced with a major problem of adjusting his behavior to environmental circumstances. Much can be learnt from the way he reacts" (29). Bosma has utilized cineradiographic studies to describe human infant oral functions and provides norms with which similar studies of children with delayed development or abnormal feeding responses can be compared. He describes normal postnatal development of this area. One of the striking changes with growth is the differential elongation of the pharynx in association with caudal displacement of the branchial skeletal support. In the mouth, with growth postnatally, there is vertical enlargement of the oral cavity associated with dental eruption, and the tongue no longer maintains general contract with the hard palate. A "masticatory space" appears. The frequent apposition of the tongue tip and lower lip as seen in infants is lost, the lips elongate, the orbicularis oris matures and differentiates so that the lips pucker as a simple sphincter, and the whole of the mobile lips participate in motions of smile or grimace. In childhood, the infantile oral reflexes disappear. Ingram also describes the dissimilarity of mature speech from infant vocalization (6).

Clinical evaluation of the oral pharyngeal area might include the following: observation of the position of the cervical spine when the child is in an upright position — for example, the cervical autiflexions and swan neck position; mandibular retrusion profile — present or absent; chin — wet or dry; nose — wet or dry; expressive movements of the face — present or absent or asymmetrical; function of the orbicularis oculi; during feeding, observation of the movement of mandible and lips in prehension, on initial closure and during swallowing; movement of the hyoid bone during swallowing, both as regards timing of the motion and tilting and tipping of the hyoid; during cry, observation of the motion of the mandible and the lips, as well as the quality of the sounds; digital examination might well include the rooting response which is normally present from birth on but becomes gradually weaker and disappears at about three months of age;. labial and buccal tone should be tested by digital examination, as well as

the sucking, swallowing response, noting the ability of the mesopharyngeal walls to constrict around the finger tip (The bite response should be tested in the lateral areas of the mandible. This is normally present from birth on, but gradually becomes weaker and disappears by three to five months of age); stimulation of the gag response should be noted not only as to its presence or absence, but at what part of the oral pharyngeal area it is first illicited.

In relation to all aspects of the digital examination, observations regarding the quality of the child's response should be made. Does the child seem to respond to a greater or less exten. than the normal?

Evaluation of the oral pharyngeal area needs to be considered in relation to the overall functioning of the child. In an infant with marked extensor thrust of the trunk and head, frequently the mandible will be depressed, the mouth open, and the tongue protrude when the child is startled or tense. Mueller has been particularly interested in developing training techniques aimed to improve the position of the lips, tongue, and mandible, as well as improving feeding and breathing patterns. She believes that techniques proposed are most effective when initiated in the young infant who has been found to have some deficit in oral pharyngeal function (44). In her experience. physical and/or occupational therapists who had special training in the neurodevelopmental type of approach and in evaluation and treatment of the oral pharyngeal area have been able successfully to integrate training procedures aimed to improve deficits in the oral pharyngeal area as a part of the overall treatment program.

THERAPISTS INCLUDED IN TEAM AT UCLA

At UCLA during the last three years, the physical and occupational therapists trained in such techniques have been encouraged with the results obtained by this approach. Evaluation of sensorimotor deficits should probably be done by each one of the therapists, but may be particularly valuable if the physical, occupational, and, hopefully, speech therapist could work together in the evaluation. When a treatment plan is decided upon, experience at UCLA has suggested that any one of the therapists may be designated as the individual to teach the mother (and any others involved in the care of the child) all of the special techniques to be used at home. This approach presupposes that each of the therapists has had the basic training in neurophysiological techniques and in treatment of the oral pharyngeal area.* In this way, therapy time is reduced, as well as the number of individuals directly concerned with the small infant. The success of the

*A film illustrating the integration of the oral pharyngeal treatment techniques with the total treatment program for the child is illustrated in a six-month-old baby who was hypotonic and had been diagnosed as having pseudobulbar palsy. Tube feeding, found necessary until that time, was entirely discontinued within

program depends upon the ability of the therapist as a teacher and of the mother as a student in learning the techniques to be employed. Visits to the therapists can be planned at weekly or more or less frequent intervals, depending upon the situation.

Nutrition in early infancy may well be of major importance in the long term outcome in respect to learning in the human infant, as has been shown to be true in studies of very young animals (55, 56).

In summary, in the program for infants, both those who have definite central nervous system deficit and/or sensory loss from the time of birth and those for whom delay in psychomotor development is found in infancy, the physician managing the patient will need to remember that the time of diagnosis is a crisis time in terms of the parents' feelings with regard to the infant and plans for his future. If specific therapy is not available, the medical-social worker may be of great assistance to the family, especially if she is called in immediately, i.e., prior to the beginning of actual symptomatic training procedures. It is very important that professional staff, social worker, therapists, physician, and public health nurse concerned, work with the mother as an interdisciplinary rather than as a multidisciplinary team. Therapists are not equipped to take the place of the social workers, nor are social workers or nurses equipped to serve as therapists. The mother is the key person in relation to the overall development of the child. The role of the professional staff is to teach her to understand and to face the various problems presented. As stated by Kagan, the first 18 months of life in the normal infant is one of tremendous development in both perceptual and motor development as well as in personality formation (36). Opportunity for as normal experience as possible is needed for the handicapped child to permit him opportunity for maximal development. Adaption of the child to the mother and the mother to the child may be more difficult if the child has physical handicaps, but may be even more crucial than if the child is normal.

Bibliography Available

For the convenience of the reader, the appendix to this volume contains an annotated list of references on screening procedures, tests requiring special training, postural and righting reflex development, and developmental sequences in the human infant.

II. THE TODDLER AGE: ONE AND ONE-HALF TO THREE YEARS

Three major developments are identified by Kagan in this age period: the ability to locomote, the ability to comprehend and speak

a month, and the child was able to be cared for in his own home. At age three years, he is functioning in the overall normal range and is attending a regular nursery school.

language, and the impositions of the first socialization demands by parents (35). Children with physical handicaps usually show developmental lags in one or more of these areas, lags which become frustrating to child and parent, even at an early age. At the request of parents of physically handicapped children and with their assistance, prenursery programs have been established in the Los Angeles area to serve children one and one-half to three years of age. As expressed by Mary L. Barrett,* for a number of years teacher-director of the Prenursery Unit for Physically Handicapped Children, a research, demonstration, and training unit in the Department of Pediatrics at UCLA, the role of the prenursery is to provide ". . . an extended family living experience in a larger than individual home where each child and his parents explore a new environment." She states that the essence of the program in a prenursery school for cerebral palsied children and/or those with other physical defects is that the curriculum be built around individual differences and specific needs to an even greater extent than for normal children. Handicapped children are more limited in experience, have been more shielded and confined, and hence have a deficit of varied multisensory experience. The prenursery seeks to give every opportunity and appropriate stimulus in a happy situation, as well as to encourage independence and self-care and development of skills" (31). The majority of children, following a period of adjustment, appeared to receive maximum benefit if they attended five days a week, the length of the day being from about 9 to 2:30, including lunch and nap. For some children shorter periods or less frequent attendance was planned as appeared appropriate to the staff and parents in consultation.

Miss Barrett believes that "The teacher cannot understand the child except as a part of the parents and home from which he comes." She believes that home visits by the teacher are needed, particularly before enrollment, if the child has not been outside the home (34). On the initial visit of parent and child to the school, the teacher observes carefully play material of interest to the child, the child's communication with the parent, the child's affection for the parent, and the parent's behavior with the child. This allows the teacher to help to make a comfortable separation for the child and parent. She prefers the parent to be in and out of the play area during this period and is happier if the separation takes more than a week. Mothers are asked, in each instance, even with two-year olds, to tell the child what she will be doing when she leaves. It has been observed that children who are too ready to leave their parents often are found one to two weeks later not to be interested in school but to be wondering what their parents are doing.

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Teacher Is Model For Mother

In the nursery the teacher serves as a model for the mother. Regardless of her theoretical and conceptional knowledge, the teacher must be able to work with the children. "The curriculum, creatively approached and based on child development principles, provides experiences in daily living in a social group in which the child is accepted, loved, and free to grow to his own potential." This type of children's community has been excellently described by Christiansen, Rogers, and Ludlum (12). The teacher is the pivotal person whose direction provides a milieu in which the child's daily activities become more than a succession of therapies. Ancillary activities, namely, "treatment," special examination, and training procedures are integrated into the nursery day.

Because of the location of the therapy room, directly opening into the classroom, very frequent observations by the therapist of the child in the classroom provide opportunity for the therapist to show teachers and volunteers techniques in handling of each individual child; to correct sitting position; and to initiate moving, standing, and other activities to be carried out in the nursery program as well as by the mother at home. We are very sure that therapy two or three times a week is just not enough to improve postural patterns. Follow-through by the school staff and by the parents is essential.

Children find it easier to move from the classroom to the therapy room than from the mother to the therapy room, generally. Often the teacher can help by bringing the child into the therapy area and staying there for a minute or so. Or the therapist moves into the classroom situation and observes the child she is about to treat. She may enter into the play activity and try to include it in the therapy program. The accomplishments and successes of therapy are evident in the classroom where the recognition and praise of the teacher and of the other children usually provide a source of real satisfaction for the child. The satisfaction a child of this age finds in therapy is often confined to the child's ability to please the therapist. The team discussion of the child gives the therapist a wide scope of the child's potentials. The group interaction, in addition to the one-to-one relationship of therapist to child, gives a more complete picture of the child's strong points, as well as weak points. The therapist will look at a child and say, "What is the most important thing that child needs from a physical stand point?" and then proceed to do it. It is most important that the therapist not lose sight of the "whole" child.

Involving Parents

Parents are involved in the program in several ways. One of the most important is the participation, by one mother each day, in the

daily routine of the nursery, a learning experience for her. At quarterly evaluation of each child, the child's parents meet with the staff to review and help plan for the program. Parents' meetings, planned monthly, are educational in orientation. Individual counseling is available to parents as well as group counseling.

The social worker involved needs to have a master's degree and at least five years experience in related service activity. As conceived by those who have been members of the staff, the social worker has several functions. On initial referral of the child she interviews the parents and often goes to the home as an invited guest (professional), for parents have no frame of reference with the nursery school. She first assumes that the parents are well-functioning adults who have special problems and need something extra to handle them. She tends to focus on the parents and their problems. No mother is prepared for a handicapped child. Many have not had the experience of a normal child in the family group. Group experience offers good learning opportunity for parents, especially parents of "toddlers" who are enrolled in the prenursery. The mother involved in the nursery school program needs to get some pleasure out of the experience (34). Thus in various ways, the staff seeks to help parents develop a realistic evaluation of the child's potential in order to assist him in attaining appropriate immediate and long-term goals.

In addition to the basic criteria for a normal program for children of this age, there is need for the development of special techniques and tools for use in the prenursery with the physically handicapped and also probably with emotionally disturbed young children. Two examples of special programs designed for physically handicapped children follow.

A *confined space*, 1¼ x 1¼ feet per person, adult or child, was set up with five-foot, plain walls on three sides, a one-way mirror taking up most of the fourth wall. The hypothesis on which this study was based was that experience in such a little "play house" would heighten perceptual awareness, lead to more interpersonal reactions, and tend to increase communication and purposeful activity. Two adults monitored the group and recorded the activity and communication before, during, and after the time (10-20 minutes) in the small confined area. Children's shoes were removed and only a few soft toys or scarves were provided, for the purpose of the study was interpersonal reaction rather than object play. Children improved in awareness; peer interaction; and social, verbal and motor activity (2).

A second technique was based on the hypothesis that multisensory training, by means of a "sensory story" presenting contrasting stimuli and composed for young hemiplegic children, would increase the awareness and use of the affected arm. This hypothesis appeared to

be upheld by studies involving young hemiplegic children in one-to-one presentations of single objects related to a story appropriate to the child's age and understanding (3). A second multisensory story, which presents a more complex situation and utilizes a turntable as a base for four scenes involved in a child's day at the prenursery school, has also been developed (32). "Too frequently we do not listen to a child, normal or handicapped, as he expresses his awareness, his thoughts, his feelings concerning himself, his social and physical environment" (34).

Listen For Clues

The following table, entitled "Clues and Causes of Delayed Speech," may be of assistance in helping to understand the young child's problems in communication (49). In this table, presented by Paine and Oppe, characteristics of children with peripheral deafness, congenital aphasia, psychic deafness (autism), and those with mental retardation are compared with normal characteristics, in relation to reaction to sounds, reactions to gestures, sensory reactions, motor function, and social responses.

Clues to Causes of Delayed Speech

Normal	Peripheral Deafness	'Congenital Aphasia'	'Psychic Deafness' (Autism)	Mental Retardation
Reactions to Sound				
turns toward or startles	only if loud	inconsistent: frequently delayed	inconsistent, delayed; responds to *absence* of sound	normal; rarely delayed
listens projectively	only if loud	no	no	may: short attention span
responds to imitation of own sounds	yes (unless severe)	yes	is disturbed, stops babbling	yes
no echolalia	no echolalia	variable	frequent, especially to whisper	sometimes
Reactions to Gestures				
responds	very much so	not usually	no	yes
uses gestures himself	very much so	may or may not	symbolizes 'internally' only, if at all	yes
reacts to movement	excessively	not usually	insensitive	yes
watches faces and lips	very much so	less than deaf	avoids faces	only normally, or less

Normal	Peripheral Deafness	'Congenital' Aphasia'	'Psychic Deafness' (Autism)	Mental Retardation
Sensory Reactions				
to visual cues, shadows	excessively	may ignore or delay response	may avoid, or delay	normal or diminished
to touch	excessively	relatively insensitive	ignores (even pain at times)	normal or diminished
to tapping or vibration	excessively	confused, erratic	ignores	often excessive
Vocalization				
spontaneous babble at 6 to 8 months	normal but soon lost	variable; none or soon lost	often none	normal or delayed
later babble for pleasure	none, but not mute	none, but not usually mute	none; may be totally mute	usually
vocalises for attention	yes	often not	no	yes
normal intonation and inflexion	no	variable	no	normal or partially reduced
jargon (appropriate for age only)	abnormal, monotonous	meaningless	no	usually
laughs and cries	diminished monotonous	diminished; whines	depressed to absent	yes
Motor Function				
coordination of hands	normal	usually clumsy	abnormal mannerisms	often clumsy
gait	shuffles feet (no auditory feedback) ataxic if vestibular damage	often delayed	not delayed; circling movements of body; walks on toes	often clumsy; milestones often late, not always
Social Responses				
normal maturity	immature	immature	immature to none	immature
normal personality	relatively normal	indiscriminate; not shy; lacks depth; preservation; distractibility; inhibition poor	bizarre; lack of affect; fascination by spinning objects; prefers objects to persons; desire for ritual, routine, and 'sameness'	may be odd but less bizarre than in autism

From Paine & Oppe, *Neurological Examinations of Children*, 1966 (50)

In a recent discussion of impaired hearing in children, Murphy calls attention to the need of differentiating hearing and listening from other aspects of the auditory response (46). Patterned sounds in the speech range have been found to be more effective stimuli than pure tones in the newborn (28).

Gordon, from experiences in a transient type of nursery school setting, reports that many of the children showed signs ". . . of increased span of interest and play, deep involvement in materials, broader areas of activity, and beginning socialization and group awareness, a feeling of increased worthiness, mastery of simple skills, more independent action and initiative, aroused curosity, and growth of trust in their relationships with teachers." She states, "If a handicapped child is not offered more than the non-handicapped in stimulation, training, and opportunities to learn the lessons of socialization, the effects of his disability are almost certain to increase, even though his original disability is not progressive" (24). As indicated by the follow-up of 64 children who had attended the UCLA Prenursery School, retrospectively, most parents believe that they as parents had made real gains in understanding of their child's problems during the prenursery school period. "A few parents of slow learning children considered that the unit provided too much pressure for the children and too much encouragement for them." A recent follow-up study still in progress again stresses the value to the parent of a holistic approach, rather than simply a therapy-training approach, for the young child with central nervous system deficit and/or sensory difficulties.

In summary, the prenursery program, teacher-oriented, appears to offer both children and parents assistance in understanding and in dealing with the various motor, sensory, behavioral, and learning problems presented by the individual child. The importance of skilled and trained staff for such a program cannot be overemphasized.

III. DISCUSSION

Lourie (39) states, "Probably the most important component of the results of the depriving experience for children who have special needs from birth on is what happens in personality development." Williams calls attention to the concept that "Maladjusted behavior is learned in the same way as adjusted" (54).

Paine, in an excellent symposium on the role of sensory experience in the maturation of sensorimotor function in early infancy, discusses the hypothesis that "Early cultural and environmental deprivation may cause irreversible mental retardation during the preschool years or even by a year of age." Restated: "To what extent does the matura-

tion of sensorimotor function during infancy proceed at a more or less predetermined rate (in association with the process of myelination of the nerve fibers as a function of tone or with other factors) and to what extent does it depend on the length of sensory experience?" (50) Paine (50) and Connolly (13) have reviewed clinical, electrophysiological, and other available data concerned with this hypothesis. Paine concluded that "Even if it can be determined that maturation proceeds more or less automatically in certain types of functions, this would not diminish the instinctive feeling that early cultural deprivation is not a good thing." Connolly suggests, "Given that we have precise information about the nature of early deficits in sensorimotor development, it should be possible to compensate for them to some degree by a careful manipulation of the environment." Various techniques designed to facilitate the establishment of connections between motor output and visual input could be developed. As an example, Braine reported in cases of premature infants and in infants with hypoxia, an impairment of cognitive functions as measured at four and seven and one-half months (8).

These conclusions do not appear to be at variance with those of Wolff, who suggests that (for normal children, raised in an adequate intellectual environment) "Most children are naturally inclined to search out novelty and, therefore, do not need controlled programs of stimulus linked to intrinsic rewards in order to learn" (58).

There is experimental evidence to show that anatomical changes may be associated with a lack of sensory stimulation in some instances, for example, deficiency in RNA in the retinal ganglion cells in animals raised in the dark (9) or the absence of Muller fibers in the retina of kittens under similar circumstances (52). On the other hand, there is a larger body of evidence to suggest that, in many instances, both sensory and motor maturation proceed as a function of total gestational age from conception, regardless of whether this is intrauterine or extrauterine, that is, regardless of whether the child is born prematurely or at term. For example, maturation of nerve conduction velocity is related only to gestational age. Nerve conduction velocity is likely to be normal in infants immobilized, as with arthrogryposis or in Werdnig-Hoffman disease. In the normal child, the maturation of motor automatisms (47) is related to gestational age. This is true also of the latency of visually evoked potentials (18).

The evidence seems to point to a high development of the human visual system at birth, but there is another kind of research which indicates that visual experience may be necessary to maintain the functional integrity of the visual system and to insure its normal development. Results of sensory deprivation differ markedly, depending on

the age at which the deprivation occurs. For example, "If it begins at or near the time of birth, the results may be devastating" (1). "If one eye of a kitten is covered during the first two months of life by a plastic occluder, the receptive fields on the visual cortex from the covered eye show markedly abnormal characteristics, while the receptive fields from the uncovered eye are normal" (27). It has been shown that there are also striking histological differences in the lateral geniculate body between the layers from the retina receiving normal visual input and those from the occluded eye (53). Recently it has been demonstrated in the normal that "In comparison with visual-evoked potentials, the type of proprioceptive-evoked response in the newborn infant is more mature" (26). Thus, it appears that sensory systems mature at different rates. These examples are cited to illustrate the current state of knowledge which indicates that, although many functions of the nervous system are probably related solely to gestational age, others may not be entirely so related.

With increasing knowledge of postnatal sensory development in the human infant, it is anticipated that earlier and more accurate evaluation of sensory deficits will be possible. Studies by many authors have demonstrated the ability of the infant to fix upon and follow an object from the newborn period. Using electro-oculographic techniques for recording, a one-day-old infant is shown to follow a target moving successively 10°, 20°, 30° to the right from center (15). Use of computor techniques in the study of correlation of movement of the two eyes in following a target is now possible.

Though data is not yet available on newborns, an eight-month-old baby was found to have left-right correlation, coefficient of .85 to .91 in the central 20° of the visual field as compared to .87 to .88 for a normal adult (33). Gatev describes a visual reflex appearing at about 73 days of age and disappearing after about one month. Disappearance occurred later with children retarded after asphyxia at birth (22). Bower states, "The overall picture of perceptual development that is emerging is very different from traditional ones. It has long been assumed that perceptual development is a process of construction — that at birth infants receive through their senses fragmentary information that is elaborated and built on to produce the ordered perceptual world of the adult." Various studies suggest that infants can register information in a manner similar to the adult, but they can handle less. Through maturation, infants presumably develop the requisite information-processing capacity (7). In a preliminary communication entitled "Visual Agnosia in Childhood," Gordon discussed the likelihood of a spectrum of visual disabilities comparable to that of auditory disabilities (23).

It is well to remember that even the newborn infant can respond

to smell and taste if strong test substances are used, the responses being evaluated on the basic facial expression or movement by mouth and tongue. Withdrawal responses and crying both document that light, touch, pain, and extreme temperatures are appreciated (50).

One of the major objectives of programs for training of young children is the relationship between such programs and the long-term outcome in respect to the achievement of maximum potential for each individual physically handicapped child. The importance of early training is suggested by studies of adolescent and adult handicapped individuals. Curtis, a vocational counselor, in attempting to find jobs for 200 cerebral palsied adults, concluded that the handling by the parents in the first five years of life was the most important single factor in the long-term prognosis (14). In another study, expected physical development occurred in only 38 percent of a group of cerebral palsied children, followed longitudinally; physical achievement was rated as fair in 20 percent, poor in 33 percent of the remainder. Factors other than extent of physical handicap appeared to be important in prognosis (59).

In a survey of adolescent cerebral palsied in Israel, the following personality characteristics were found:

concentration poor 70%
adjustment to handicap poor 53%
social maladjustment 44%
emotional imbalance 48%
work attitudes poor 48%
little independence 75% (40)

Again in a study in New York, this time involving adults, the author found prognosis related to the following factors:

exaggeration of handicap
relation to others
emphasis on normal classes
social independence
parental understanding
parental attitudes
isolation
early total rehabilitation (41)

These examples emphasize the great importance of personality development in the long-term prognosis and the need for parent counseling and guidance.

iV. SCALES OF DEVELOPMENTAL PROGRESS

As indicated in the listing appended, various attempts have been

made to delineate normal sequences, both for the purpose of quick screening and for more detailed evaluation of the developmental progress of children. Children with mental retardation frequently show delay in all areas, whereas those with central nervous system abnormality often reveal a wide scatter.

In addition to scales listed, a recently proposed graphic method for evaluation of motor development in children has been described by Zdanska-Brinker and Wolanski (60). Percentile tables and graphic presentation of different stages of motor development for head and trunk movement, development of sitting position, development of standing position and development of ten stages of locomotive development are described.

V. CONCLUSION

In conclusion, the programs described in this presentation stress the importance of each of the seven basic areas which Murphy suggests for evaluation of programs for children under three years of age, namely, 1) adequate nutrition; 2) ability to deal with the baby in distress; 3) stimulation designed to meet the infants needs, tolerance level, and capacity for enjoyment; 4) talking to the baby; 5) opportunities for exercise of emerging sensory motor functions; 6) encouragement of the baby's efforts; 7) continuity in a few basic warm relationships (45).

It is well to remember that "A disability is a condition of impairment, physical or mental, having an objective aspect that can usually be described by a physician. A handicap is the cumulative result of the obstacles which disability interposes between the individual and his maximum functional level" (25).

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RESEARCH IN COGNITION: IMPLICATIONS FOR EARLY CARE

Halbert B. Robinson, Ph.D.

A CHANGE IN PERSPECTIVE

There has recently occurred, as I am sure you are aware, an increase in national concern with the very crucial period of life-after-birth, an increasing awareness of the hazards and potentialities which abound during the first two years of life. The very inclusion of the present topic of discussion in this meeting is evidence for a relatively recent willingness of professionals to consider the many facets of a child's development. A few years ago, many of us would have questioned the importance of discussing the cognitive development of what we considered to be a tiny creature dominated by his emotional development, waiting through the period of the maturation of sensorimotor skills. Perhaps without even giving it much active thought, we have all shifted our perspective. As we have turned our attention to the plight of children who are handicapped physically, emotionally, and intellectually, we are finding that for those who are out of the normal stream of development, remediation is extremely difficult — kindergarten, even with a "Head Start," is indeed too late for some children. We are realizing that we must do our utmost to prevent both catastrophies and insidious kinds of damage to our young. And when, despite our vigilance, early damage does occur, we must do what we can to rectify and compensate for its effects on the very vulnerable — and at the same time, very resiliant — young child.

NEW DIRECTIONS IN RESEARCH

Today, then, I am going to talk first about some notions which are emerging from research with normal infants and toddlers, which seem to point some possible directions for research with very young, damaged children. Second, I would like to suggest a few guidelines implied by these notions in terms of the kind of work that can and should be done with these infants.

Capacity of Baby For Learning

Probably the most startling and most important conclusion to be drawn from recent research with infants is that from the moment of birth, and perhaps even before, the baby is capable of learning much

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more than we ever gave him credit for. Research has repeatedly demonstrated the infant's ability to learn. Within the first few days of life, for example, he is able to discriminate complex visual patterns (Lipsitt, 1967, Sequeland, 1970), to turn his head to right or left at an auditory stimulus (Papousek, 1967), to drink from a cup (Sears and Wise, 1950), to adapt to an imposed feeding schedule (Marquis, 1941), and so on. Within a very few months, he learns to make appropriate social responses to the human face (Gewirtz, 1965) and to manipulate his environment by crying and vocalizing. His grasping at objects can be accelerated (White and Held, 1966), as can his general development be accelerated, under stimulating conditions, considerably in advance of what we have considered "normal" (Ainsworth, 1967). In terms of the organization and efficiency of the central nervous system, the young infant is obviously much more capable than was at first recognized.

One of the reasons this capacity for learning was not recognized, I think, is the imperfect ability of the infant and toddler to express their cognitive skills through their lagging complex sensorimotor functions. The baby cannot tell us what he knows. Most observers of infants and toddlers — struck with the dramatic maturation of their biological systems, their growing coordination, strength, mobility and dexterity — have tended to regard this period of life as a sort of prolonged gestation outside the womb. Thus, infancy has frequently been seen as a time when the main concern is simply that the child have a rich and protected environment which is supportive in much the same way that the womb supplies biological needs and assures security. The development of sensorimotor skills is, certainly, an extremely dramatic and exciting part of what takes place during infancy and toddlerhood. From a randomly flailing, weak, and uncoordinated newborn to the running, climbing, fine-fingered two-year-old, a complete metamorphosis has taken place in the child's ability to control himself and his environment. We must be very clever if we are to be witness to the rapid learning process which is in fact taking place in his mental processes. For example, by letting an infant grow tired of seeing one stimulus and then slyly substituting another which is just a little different, we can observe whether he can discriminate between the two, observing whether he shows renewed visual regard and interest (Siqueland, 1970). This kind of behavior can be observed from practically the beginning of postnatal life, long before there are sufficient voluntary motor responses or other kinds of evidence of discriminative ability.

Little wonder, then, that in almost every major theory about early development, the sensorimotor area of growth is emphasized. Skinner, Piaget, Gesell, and others have all emphasized this development

of the capacity to coordinate and refine sensory input and response output. For Piaget, to take one example, the growth of intelligence during the first two years resides almost entirely in the sensorimotor area, although by this view he means considerably more than mere motor skills. But we may legitimately wonder whether, in terms of cognitive development, we have been wise to give such exclusive attention to the sensorimotor development of the infant. It may, in fact, be less worthwhile to try to change the patterns of sensorimotor development of normal children than to accelerate their intellectual development (Robinson and Robinson, in preparation). Efforts to program the development of sensorimotor skills more effectively may, indeed, be rather superfluous (at least, for the child without handicaps). The physical environment alone provides a pretty good "program" of learning conditions for the normal child with help from adults, only in terms of protection from hazards and in providing an interesting environment. The force of gravity, for example, is a constant to be reckoned with; it does not change, and the feedback to the infant during experimentation is immediate. The interplay between size and distance is complex but relatively stable from one occasion to another. If the infant reaches for an object which is farther away than he thought, he misses and tries again. Given a safe and reasonably varied environment, then, the normal infant's sensorimotor skills are going to be exercised and developed in the service of curiosity and in the pleasure of practising the difficult. Because of both its constancy and its ability to provide novelty and challenge, as well as its immediate feedback, the physical environment is quite a good teacher in itself.

It should be *stressed* here that this statement will need some modification concerning damaged infants, some of whom will need special help, because they cannot achieve an optimally balanced interaction with the environment. Obviously, those with impaired muscular control, disordered perceptions, or loss of acuity in sensory functions, need specific kinds of remediation.

The question arises as to whether symbolic skills should not be given at least as careful attention during the earliest months and years as is sensorimotor development. There seems some reason to think that the symbolic processes merit much closer attention than previously we gave them, particularly where it seems obvious that what we might call "programming" is not so simple. Human caretakers are not so predictable, so repetitious, nor so prone to give immediate feedback as is the physical world; representational processes in the infant are not always recognized or understood; and sometimes we may discourage what we should applaud. And although the ways in which children acquire language do, in general, seem to be similar

everywhere (Lenneberg, 1969), we know that there are great individual differences in effectiveness and, perhaps, even in forms of symbolic processes, communicative skills, and abstract thinking from one child to another, and probably from one group to another.

Recognizing the importance of the development of symbolic skills and the relatively more complex role played by human caretakers, there arises the issue of programming — more specifically, the question of the accuracy of what we might call an expanding versus a stage model of intellectual development. As an analogy, we might think of a computer whose capabilities we plan to increase. We can accomplish this in different ways. First, we can concentrate on the development of an ever-increasing number of programs which are sequentially wired into the computer; the computer remains essentially unchanged but is more effective because there is a wider range of programs available. Essentially, the computer can handle greater complexity and breadth of coverage because of its new components, and certain functions are made more adaptive in this way. On the other hand, we may decide to build a new computer which is designed along different lines, is capable of more complex functions, and provides a capacity which is different in kind, as well as in the number of programs it can handle.

A Look at Intellectual Development Models

If intellectual development proceeds by the first model in a continuous progression, as might be suggested by the work of many learning theorists, then we would not tend to give special, or early emphasis to the symbolic functions; such theories, in fact, provide little guidance about the ways in which optimal development of the young child should be encouraged. Roughly, these theories imply "the more, the better" — but the more, precisely, of *what*?

A model of development which proceeds by stages would suggest that careful attention be paid to the early stages of those capacities which, when they emerge, will produce a kind of quantum jump in the child's ability. With the emergence of the symbolic functions of language and representational thought in particular, the child seems to have undergone a metamorphosis; he is in many ways a new organism. None of us would maintain, however, that these symbolic processes emerge *de novo*. There has been a progression of development, beginning no doubt in the earliest weeks and months of life. Although we do not know just what all the precursors are, or in what ways they are responsive to the environment, we are beginning now to see that it is important to find out.

Let me at this point mention one additional change in current thinking about very early childhood which is basic to understanding

new developments in the professional field. That change is the recognition that an infant is a complex creature like the rest of us and that it is misleading to underestimate the wealth of his experience and the multifaceted nature of his development. No longer must we consider infancy as a time when all the child need learn is a feeling of trust in the world. Certainly he needs to learn that; there is no doubt that infancy is indeed a crucial time for emotional and social learnings, and it is justifiable to emphasize the particular needs of the infant for relationships with caretakers, for security and predictability, and so on. But we need not stop there. A careful reading of the data tends to indicate, I believe, that enhanced growth in one area does not generally happen at the expense of that in other areas, but rather tends to interact in a positive way. We need not believe that we will somehow damage the child's personality and biological development if we set about enhancing his cognitive development in a reasonable way. On the contrary, that which is intellectually stimulating is very likely to enhance the infant's and toddler's joy in mastery, his delight with himself, and his developing new sensorimotor skills. There may, of course, be asynchrony; for brief periods the child may seem to concentrate his resources on one activity more than others — just as, when he initially starts to walk, progress in toilet training and verbalization tend to become temporarily a little slower (Smith, 1925).

Tentative Implications

With this general background, let us try to draw some tentative implications about programming learning situations for infants and very young children. Considering the paucity of research on intervention with infants and toddlers, this is a task to be approached with great caution. Nevertheless, if our hypotheses about the crucial nature of these early years are correct, then it is our responsibility to do the best we can with what evidence is available, and to evaluate our efforts constantly.

Concerning children with known handicaps at this early age, however, it is even more difficult to establish these guidelines. There has been little attempt to program learning experiences for very young children, aside from some systematic attempts at sensorimotor remediation with cerebral palsied, blind, or deaf children; I am not aware of significant empirical research which has tested one method against another even with these children. But there is some evidence available; for example, at the University of Washington, one of our staff members has done some pilot work with Down's Syndrome infants and their mothers, in a planned sequence of sensorimotor and communication tasks; and again with Down's Syndrome infants, enrichment of the environment in an institutional setting has apparently en-

hanced the development of these infants, although not quite so positively as has home care (Stedman and Eichorn, 1964). Down's Syndrome infants, are, of course, an especially fascinating group to work with because they can be identified so early, because their development in the early months is usually not so grossly retarded as it later becomes, because the source of the defect is known, and because the biological defects are presumably relatively similar among infants in the group.

The situation is not so simple with the target children for our meeting today. Children with cerebral dysfunction are not a homogeneous group; they cannot all be identified at birth. In general, the earlier their handicaps are apparent, the more serious these are. Some infants have rather circumscribed problems which, especially if treated, can be lived with in a relatively normal fashion, while others are so grossly damaged that our goals for them must be very different.

Programming for such children must, of course, be a highly individualized affair. Early treatment of the handicap — before it festers into generalized damage to learning and to the child's self-image — may be especially important in keeping the child as much within the normal stream of development as possible. Postponing help for children whom we think we know how to help is certainly not advisable, for although it may not be literally true that lost time can never be made up and that by kindergarten it is already too late to help, still there is no doubt that remedial efforts are much more difficult (in the cognitive sphere, at least) than those which promote optimal development from the start.

SOME SUGGESTED GUIDELINES FOR PROGRAMMING

We should begin as early as possible with carefully planned experiences for children, particularly those whose physiological handicaps or whose unfavorable environments are likely to limit their development. Growth of the brain is never again so rapid as during the earliest period of life; for the most part, structures and functions are the most pliable and most vulnerable during the period of their most rapid organization (Scott, 1968). It is during this period I believe, that carefully planned or programmed experiences will have their greatest and most enduring effect. Provided we know *what* to do, we may conclude that the earlier we start, the better.

That an infant can be taught a particular response is not sufficient evidence that he should be taught it. To say that special experiences for children should begin early is not necessarily to say that infants should be taught anything and everything which we can manage to teach them. We need careful, large-scale, and long-range studies point-

ed toward the ultimate effects of specific methods and contents of early teaching. It is possible, for example, that in some areas the very early teaching of a concept or skill may prevent an easy transition to a more mature grasp of the process later, and this could be more true of some ways of teaching than of others. One problem which has interested me for some time, for example, is the possibility that infants and very young children might be taught to read in the same way that they are taught to speak — that is, directly, without an intervening process (not the see-say-listen-comprehend method, but the see-comprehend method). Such a procedure would be difficult to engineer, yet with our ordinary teaching methods of saying words aloud, it is possible that early teaching is handicapping rather than enhancing. Obviously, priorities will have to be set.

High priority during the first two years should probably be assigned to the symbolic and communication skills, and to the basic concepts and skills which enhance their emergence. One good guess is that we should concentrate on the distance receptors in our programs — vision and hearing — since these are readily modifiable (Watson, 1969) and are basic ingredients of symbolic responses. And we may find that there are fundamental differences in the adult-child interactions of various groups which are related to ultimate differences in their cognitive functioning. It is of interest, for example, that mothers who seek to accelerate the development of their infants are more likely to engage in frequent, back-and-forth babbling with their baby girls than boys (Kagan, 1969); the relationship between this circumstance and the enhanced verbal facility of girls is not yet known, but the notion is intriguing.

In programming for children, it is important to know what systems are intact and functioning at any given point in time. Development proceeds as a continual interaction between the environment and systems (simple or complex) which are already set up. Some of these systems, like sucking, appear to be "pre-wired" — babies are born able to suck, though sucking improves very rapidly as it is put to use in the first few days of life. Some of the earliest learnings revolve around and build upon this reflex behavior. Other systems must be built as the "pre-wired circuits" are modified in interaction with the environment. A great deal of this basic circuitry is probably laid down during infancy, when development is so very rapid.

Successful programs will most likely be those which define long-range goals and work out sequences of steps to their attainment. To judge by compensatory programs which have been conducted with preschool children, the successful ones have been the more structured ones. They have tended to define the behaviors to be taught and then to work out step-by-step increments designed to reach these goals

(Karnes, Hodgins, and Teska, 1968). Their relative success may be attributable to several possible factors.

1. They have recognized that some abilities, skills, and knowledge are more important than others and have accordingly assumed the responsibility for making value decisions.

2. They have proceeded with the difficult "vertical" learnings which are basic to subsequent steps and have laid relatively less emphasis on breadth. Thus, the size of the young child's vocabulary would be considered less important than acquiring the important structural elements of language.

3. The role and degree of commitment of the teacher is crucial. In addition to working with areas which are intrinsically important, having the responsibility for choice and planning may produce special enthusiasm and focus on the part of the teacher.

4. Sequencing the steps to the selected goals not only tends to ensure that essential steps are not overlooked, but also challenges and intrigues the infant at the same time that he receives abundant reinforcement for learning. Whether one looks at this idea through the view of a Skinnerian (emphasizing not only the careful sequence but the reinforcing consequences), a Piagetian (emphasizing the necessity for mastering one foundation schema before developing the next), or a Hebbian (emphasizing the underlying neutral organization) — that is, regardless of the theoretical approach used, all theories agree in their emphasis on the necessity for careful sequencing.

5. The sequencing pattern, despite its superficial appearance of greater rigidity, actually reflects a greater sensitivity to where the infant "is" than does a seemingly more flexible unstructured program.

6. Closely related to individualization is the notion of the "match" (Hunt, 1961), a concept which likewise could have been deduced from any of a number of theoretical positions and which is vital to programming learning. This concept refers to presenting a task which is neither so easy as to be boring nor so difficult as to make no impact on the child's conceptual framework; he "stretches" to reach it. Such experiences are more likely to occur when conditions have been planned than when they have not.

7. The aid of the parents must be enlisted in providing optimal conditions for learning. Even when afforded highly stimulating and carefully planned experiences in day care, nursery school, or various therapeutic arrangements, the infant will spend more time and probably have more significant interactions with his home caretakers. Their role in the structuring of his environment is crucial and must be coordinated with the structuring roles of others.

Evaluation Is Continuing Need

Finally, let me emphasize that this area is fraught with unknowns—unknowns about the capabilities of children, unknowns about the consequences of how's, when's and what's which we have not yet recognized. The immediate need for service to children, and particularly to handicapped children, must not blind us to the need for long-range and sensitive evaluation of the effects of our service.

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THE ROLE OF THE PSYCHOLOGIST IN PROGRAMMING FOR INFANTS WITH KNOWN OR SUSPECTED CEREBRAL DYSFUNCTION

C. R. Strother, Ph.D.

EARLY CHILDHOOD CARE IS NEW FEDERAL EMPHASIS

The topic of the present conference is timely. In a recent message to the Congress, President Nixon announced the commitment of the federal government to a broad program of early childhood care. This will encompass intensified research, both basic and applied, the establishment of pilot and demonstration programs, and support of day-care facilities particularly for working mothers on a very large scale.

This program represents a new departure in public policy. With the exception of a period during World War II and some limited programs initiated recently, federal and state governments have not undertaken the development of day-care facilities for very young children. One of the principal reasons why the United States has lagged far behind many other countries in the establishment of such facilities is that in this country the rearing of children until they reach school age has been considered the exclusive responsibility of the family. Traditionally, government has avoided any encroachment on this prerogative. Now, however, it proposes to intervene on a large scale. If the Administration's welfare reform bill which is now before the Congress should pass, in the year beginning in July 1971 the government will spend $382 million subsidizing day care for 450,000 children of welfare mothers. This and other early-childhood programs will inevitably have a very significant effect on the future of our society.

What accounts for this change in public policy? Why is the government now willing to enter an area that has previously been reserved to the family? Why is there such widespread interest in programs outside the home for infants and young children?

One factor has been a growing conviction that present welfare policies tend to create dependency and perpetuate poverty. If mothers are to be encouraged to contribute to the family income by working, day-care facilities for their children become imperative. A second factor has been of equal importance — the accumulation of evidence that the period of infancy and early childhood is a major determinant of the child's later development. There is now a substantial body of

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psychological research to support this assertion. A large proportion of cases of mental retardation is attributed to adverse environmental conditions in early childhood. The relatively low level of achievement and apparent lack of motivation of children in impoverished urban ghettoes and rural slums is considered to be related to an environment lacking the conditions essential to early learning. Experimental programs, though still too recent to yield definitive evidence, at least create a presumption that appropriate conditions and methods can accelerate early learning and significantly raise the child's intellectual level. Experience with the Head Start program seems to indicate that compensatory education for the handicapped and disadvantaged should start at an earlier age than three years in order to yield maximum benefits.

Whatever the influences may have been that have brought about this important change in public policy, there can be no question that we are now committed to the establishment of day-care facilities for a very large number of young children. While such a program was probably unavoidable for social, economic, and political reasons, it is premature from a scientific standpoint. Too little is yet known about learning in infancy and early childhood and its later effects, not only on cognitive development but also on social development, to provide an adequate scientific basis for day-care programs below the preschool age level. President Nixon's recent message on educational reform acknowledged the urgency of establishing experimental centers to provide the information necessary if the new child-care programs are to offer anything more than custodial care and unskilled baby-sitting services.

Institutional Structure in Day-Care Services

Before discussing the contributions which the psychologist may be able to make to an experimental interdisciplinary program, I should like to digress for a moment to consider the institutional structure within which future infant care programs can be developed. This institutional context, whatever it may prove to be, will inevitably affect both professional relationships and program structure. It seems highly unlikely that a completely new institutional structure will be established for day-care programs. It is probable that they will be developed within some existing institution: the health-care system; the educational system; or the public welfare system.

There are already well-established precedents in the health-care system, both public and private. In the public sector, crippled children's clinics and well-child clinics have long been supported by the Children's Bureau and public health agencies. More recently, the maternal and infant-care program of the Children's Bureau has pro-

vided facilities for diagnosis and health care for high-risk mothers and their infants. In the private sector, pediatric and orthopedic clinics and specialized clinics, such as those for cerebral palsy, have provided care for infants. While these programs have been concerned largely with medical care on an out-patient basis, they could certainly incorporate the day-care and home-care elements which are necessary components of any comprehensive program for infants. Our health-care system is, however, undergoing rapid change and the future structure of this system is hard to predict. At the present time, although the federal government is proceeding to support the establishment of categorical facilities such as comprehensive mental health centers and community mental retardation facilities, there is increasing emphasis on comprehensive health planning. In urban areas, there is some trend toward incorporation of health centers in comprehensive social service facilities. The point to be made here is that the form of the future health-care delivery system will affect the nature of the programs which can be developed for the care of infants.

Passage of the Handicapped Children's Early Education Act staked a claim for the education system in programs for infants and young children. This progressive legislation, recognizing the importance of beginning the habilitation of the handicapped child in infancy, has attempted to encourage school systems to extend their programs downwards to an age level that has never before been considered a responsibility of the public schools. Other social events make this an inopportune time for the schools to consider enlarging their traditional role. The problems of school finances, of integration, and of student unrest are of paramount concern to school administrators. Schools of Education, too, have generally not manifested strong interest in the training of personnel for early childhood education programs. Neither the methodologies nor the content of elementary education is readily applicable to infants or to very young children.

Reactions against the "baby-fold" and the orphanage, reinforced by some research data on the deleterious effect of institutionalization on children, have led to a marked trend in social welfare programs toward home care—either in the child's own home or in a foster home. The responsibility of the welfare agency is usually limited to determination of the elegibility of the child for care or, if a foster home is required, to selection and licensing or supervision of the foster home. It was not until group foster homes and day-care facilities began to be available that public welfare agencies became involved with problems of the qualifications of child-care personnel and with the adequacy of the programs provided for welfare children. In the immediate future, it seems likely that the most rapid increase in facilities for infants and young children will be in day-care facilities under public welfare agencies.

Ultimately, coordination of health-care and social welfare programs for young children can be anticipated, but for the time being a pluralistic non-system is more likely to develop with some facilities in health-care agencies, some under social welfare agencies, and some under public school or university auspices.

There is, currently, an important role to be played by private agencies in the development of comprehensive programs for infants and young children. That role is the establishment of and experimentation with model programs. Private agencies have a great deal more flexibility than most public agencies in the introduction of new concepts, in the definition of new patterns of interdisciplinary relationships, and in the incorporation of new types of child-care personnel.

What should be the structure and content of model infant-care programs? In discussing this I should like to make the following assumptions, which I hope will be non-controversial:

1. That a model program should be comprehensive, in the sense that it should provide for the physical, the affective, the cognitive, and the social development of the infant;
2. That a model program should enhance the ability of the family to stimulate and sustain the child's development; and
3. That continuity of development must be insured, lest early gains be followed by later regression. This is certainly one of the important lessons to be learned from the Head Start experience. Infant-care programs would be a tragic waste unless followed by effective preschool and elementary school programs.

ROLE OF PSYCHOLOGIST IN INTERDISCIPLINARY PROGRAMMING

With this lengthy introduction, I turn finally to my assigned topic, the role of the psychologist in interdisciplinary programming for infants with known or suspected cerebral dysfunction. Traditionally, the role of the psychologist in work with infants has been primarily in the assessment of current developmental status, the classification of the child as retarded or normal on the basis of psychological tests and observations, and the prediction of a prognosis for his future intellectual development. As evidence of an insignificant relationship between scores on tests presumed to measure "infant intelligence" and scores on intelligence tests at later ages began to accumulate, confidence in the predictive validity of infant tests diminished. Irwin, for example, in an important article entitled "Do Infants Have I.Q.s?", expressed the growing disillusionment with infant tests. For a variety of reasons,

which need not be discussed here, attitudes toward the nature of intelligence and the relationship of early experience to later behavior have undergone fairly radical changes since the time that article was published.

New techniques have been developed for determination of the response capacities of infants (5, 7, 8, 12), significant new behavioral and environmental variables have been identified (1, 6), and new psychometric instruments have been constructed (13), some on the basis of a particular developmental theory (14). As a consequence, the psychologist is beginning to be in a position to make a more important contribution to programming for infants. He can now assess more accurately such factors as automatic responsivity, activity level, sensory and perceptual functions, and attachment behavior. There is increasing evidence to indicate that individual differences in such characteristics may be important determinants of development. If so, then the design of developmental programs for infants must take individual differences into consideration. For example, what may be an optimal level and variety of stimulation for the normal child may constitute over-stimulation and result in confusion and anxiety in a brain-injured infant.

The psychologist, as a psychometrist, also has an important contribution to make in measuring changes in the infant's behavior as a function of programmed interventions and in evaluating the relative effectiveness of different programs over both short and long intervals of time. Until sufficient data of this sort can be accumulated, all programs for infants must be considered strictly experimental.

The psychologist is in a position to make a significant contribution not only as a psychometrician, but as a developmental theoretician and as a behavioral engineer.

Whereas psychological research in infancy in the 1930s and early 1940s was largely empirical and descriptive, developmental theory is now having an increasing influence on the direction of research and therefore should play an important part in the development of experimental infant-care programs. I should like to discuss briefly the programmatic implications of three theories of development—cognitive theory as represented by Piaget (10), learning theory as represented by Bijou and Baer (2), and ethological theory as represented by Bowlby and Ainsworth (1).

Sequence of Human Growth

Perhaps Piaget's major contribution to programming for early childhood education lies in his exposition of a sequence of stages in

cognitive development and his description of the operations involved in each stage. Piaget was not initially concerned with the translation of his theory into a training program and most of the research which has been done, at least in this country, in an attempt to determine the extent to which Piaget's developmental stages might be accelerated by systematic training, has been done with children of preschool age or older. Piaget's discussion of infant development and a rapidly increasing body of research based on his theory provide a rich source of ideas for experimental programs.

Piaget considers the period of infancy to be a succession of stages of sensorimotor and early symbolic development. Beginning with primitive innate patterns of behavior—such as the passive sucking behavior of the neonate—the infant encounters different environmental conditions which require a progressive modification of his behavior. These changes ("accommodations") occur in each behavior modality. The essential requirement of an optional environment at this stage is variation in stimulation for the various sensorimotor modalities. More specifically the infant should be confronted with a variety of things to suck, to look at, to reach for, to feel, to grasp, etc. For a physically handicapped child, who may have difficulty with the development of adequate patterns of motor behavior, special attention must be given to environmental arrangements that will facilitate progressive improvement in motor coordination. This is, of course, not a new idea in the field of cerebral palsy where a great deal of attention has been given to this problem by surgeons and therapists.

At the next stage in his development, the infant begins to coordinate these simple patterns of behavior. Sucking and looking begin to be coordinated with reaching and grasping; hearing begins to be coordinated with looking. Although opportunities for such coordination occur naturally, there is research to support White's statement that:

" . . . aspects of early visual-motor development are remarkably plastic. As yet, we know neither the limits of this plasticity nor the range of visual-motor functions that fall within this classification. At the very least, the onset of hand regard and visually directed reaching and the growth of visual attentiveness are significantly affected by environmental modification" (15:168).

To condense and oversimplify Piaget's analysis of the subsequent stages of sensorimotor development, the infant begins actively to manipulate his environment, at first repetitively, then experimentally. Through these manipulations, he begins to develop concepts of object permanency, space, time, and causality. During these periods, the environment should be arranged to provide variety, novelty, opportunities for imitation, manipulation, and experimentation.

Antecedents and Consequences of Behavior Stressed

A second important theoretical contribution to child development programs is that of Skinner. This has been systematically applied to infant behavior by Bijou and Baer (3). In the context of the present discussion, the more important distinctions between Skinner's theory and that of Piaget are: Skinner's concern with overt behavior as opposed to cognitive constructs; and Skinner's emphasis on the immediate antecedents and consequences of behavior rather than on the interaction between the child's cognitive structure and his environment. With respect to formulation of a program for the modification of infant behavior, Piaget would contend that there is a necessary sequence of stages through which behavior develops and that development can be facilitated by arranging the environment so as to provide the infant with an opportunity to engage in that behavior which is the next necessary step in this sequence. From Skinner's standpoint, behavior is more flexible. The course of development is determined by the eliciting and reinforcing stimuli provided by the environment. The modification of behavior, from this point of view, requires: 1) that the behavior which the infant is to develop be defined; 2) that eliciting and reinforcing stimuli be brought under control. If these conditions are met, then, within the constitutional limits of his response capacities, the development of the child"s behavior can be arbitrarily determined.

Without getting involved in the heated arguments over the adequacy and comprehensiveness of the theory, it has been convincingly demonstrated that this approach provides a powerful technique for the modification of many aspects of behavior—social as well as intellectual. Knowledge of these techniques of behavior modification will greatly enhance the effectiveness of caretaking personnel.

If a Skinnerian approach is to be applied to the development of a child-care program for infants, the first step involved is a determination of the behavior which is to be developed. This may be defined in several ways. One might, for example, extrapolate from behaviors considered important to school or preschool achievement. In this case, one would ask, for example, what successive modifications of the child's present behavior will enable him to read. If the earliest necessary responses are behaviors such as visual fixation and form discrimination, then these constitute the starting point for the training program. For learning to occur, effective reinforcers must be identified and developed and efficient discriminative stimuli must be designed. There are other ways in which the desired behavior might be defined. It might be defined arbitrarily by the parent or parent surrogate. It might even be defined in terms of the behaviors char-

acteristic of Piaget's various stages. In any case, the procedures for development of the desired behavior would be the same.

This approach provides a very explicit basis for a developmental program. There is good experimental evidence that operant conditioning is effective in modification of the behavior of very young infants (7, 11). The procedures involved are equally applicable to the behavior of parents and teachers, who can learn to apply these techniques themselves in their interactions with the infants.

Child's Attachment to Mother Considered

A third theory which provided an important basis for the development of programs for infants has been termed "ethological theory." It is discussed here because of the stress which it places on an aspect of behavior which is not dealt with as extensively by either of the other theories. This aspect of behavior is the child's attachment to the mother or other parent surrogates. The reason why it seems important to give particular consideration to attachment behavior should be obvious. Even if any planned program of infant development is carried out exclusively in the home by the mother, it will alter in some way the interaction between mother and child. If a substantial proportion of the infant's waking time is spent outside the home, in a day-care facility, the relationship between mother and child will be affected more extensively. Since this relationship is a very basic factor in child development, it would seem necessary to consider carefully, to evaluate critically, and to control the effects of any given program on the child's attachment behavior. Bowlby (4) has discussed extensively the phases and processes which, from his point of view, are involved in the development of attachment behavior, and Ainsworth (1) has recently published an excellent critique of this theory and an analysis of related theories.

Bowlby argues that attachment (and attachment behavior) develop as a consequence of proximity and reciprocal interaction. He maintains that the infant has a bias toward attachment to a single figure, usually the mother, but that attachments can develop to other persons or to inanimate objects. The nature of other attachments that may develop will affect the attachment to and role of the mother. The nature and extent of this effect is a question which cannot be avoided in the development of any program for infants.

There is more that could be said about possible contributions of psychology to programs for infants with known or suspected central nervous system involvement. Nothing has been said about the special problems which may be involved as a consequence of sensory or

motor deficits. These problems may require careful assessment, special therapeutic interventions or special materials, but, as far as program goals and sequences or the learning principles involved, they do not differ from the problems of the normal child. Attention may be somewhat more difficult to structure than for the normal child, but the procedures required to develop attending behavior and perceptual discrimination are not significantly different. The difficulties experienced by brain-injured children in concept formation, problem solving, abstraction, and other higher cognitive behaviors lie beyond the area of our present concern.

Other developmental theories which might contribute to an infant-care program have also been omitted. The most conspicuous omission is analytic theory. The rationale for this omission is the fact that analytic theory has not lent itself well to scientific inquiry and thus has not commanded much attention from psychologists in recent years. This is not to deny the contributions of analysts to our present understanding of important aspects of child development or to pertinent observational data.

Several Contributions From Psychologist

In conclusion, I have attempted to indicate that the psychologist is in a position to make several contributions to programming for infants. As a psychometrist and clinician, he is able to develop and apply measures of individual differences in response styles and capacities and to assess the direction and extent of changes in the infant as a consequence of various intervention strategies. As a developmental theorist and experimentalist, he can contribute both to program content and methodolgy. As a humanist (and I would hope that psychologists who propose to become involved in programming for infants would identify themselves as humanists), he should be able to make a responsible contribution to the value judgments which should be explicit in any decisions on the development of programs which will affect not only the lives of our children but the structure of our society.

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EDUCATION FOR THE VERY YOUNG HANDICAPPED CHILD: A CURRICULUM CONCEPT

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ANSWERS STILL MISSING

Answers to even the most blatant theoretical and practical problems relative to the education of infants and nursery age exceptional children are not readily available as yet. There is, however, rather general acceptance of the notion that early childhood is the optimal time to begin educational intervention, even though the efficacy of on-going educational programs is still in question.

While the nature-nuture controversy is an interesting one and has rekindled heated discussion in the United States upon the recent appearance of Jenson's article on genetic bases for intellectual inferiority, personal restraint dictates that I but acknowledge the issues. The present paper, however, is strongly based on the notion that environmental intervention will make a noticeable difference in a child's function. With this bias I quote, rather confidently, Professor Benjamin Bloom (1964) of the University of Chicago who surveyed and anayzed hundreds of longitudinal studies of human growth to explore the times when individual characteristics develop, the conditions under which they can be effectively altered, and the kinds of environments that stimulate or retard human development. He concluded that half (50 percent) of all growth in human intelligence takes place between birth and four years of age. Another 30 percent occurs between ages four and eight years and that the remaining 20 percent appears between eight and seventeen. In other words, according to Bloom, more than one-half of the child's growth takes place before he arrives at school.

Genetics vs. Environment Controversy

Even Jenson (1969), in his highly controversial reports highlighting genetic factors and questioning the environmentalists, indicates that the only supportable upward shifts in I.Q. associated with environmental factors were related to " . . . *young children whose initial social environment was deplorable to a greater extent than can be found among any children who interact with other people*

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or are able to run about out-of-doors." For these children he suggests that a shift to good average environmental circumstances can boost the I.Q. 20 to 30 points and in extremely rare cases as much as 60 to 70 points. Does this not seem to refer to the disabled children confined to their beds, or to a chair in a hospital, or in an institution for the retarded or emotionally disturbed, or inactive at home and to children whose parents might be intensely upset, disappointed, or guilt ridden about their distorted social relationship with the child with a sensory handicapped or communication problem.

As you all know, the United States and other parts of the world have been concerned about early intervention for many years. But we are now responding to new pressures brought about by the unbelievable 1964 rubella epidemic and congenital problems resulting from it and other causes. One major example of education's national action is seen in the U.S. Office of Education's Handicapped Children's Early Education Assistance Act, P.L. 90-538 (1968).

As yet though, there is no apparent agreement on the use of *specific* kinds of *specific* interventions appropriate for *specific* educational problems or upon evidence of identifiable behaviors of children. The dearth of systematic research and published reports of educational program development for infants and young children would have precluded the preparation of a paper which provided the blueprints and definitive specifications of the ideal program. My, how I appreciated the title, "A Curriculum Concept." Thus with somewhat greater comfort, I shall present some of the ideas which seem to be evolving at Teachers College, Columbia University. We are still exploring, hypothesizing, and relating directly to young handicapped children.

EARLY EFFORTS WITH CURRICULUM DEVELOPMENT

You will recall our early effort (1964), the Experimental Curriculum for Young Mentally Retarded Children, was an attempt to articulate a step-by-step guide for *teachers* and a structuring of action settings for *children* with emphasis on clearly noted stimuli of interest to specific children to provoke their action for immediate, selective reenforcement by teachers. The experimental setting was seen as the provision of a means of learning, of seeing relationships, and of problem solving. The teachers, directed by their curriculum guide, introduced stimuli not as an isolated process to increase the number of facts or skills known by the child, but rather as a provision of new information to lead to new discoveries by the child—to be differentiated by him, to be reorganized, and then to be integrated for more effective patterns of behavior and readiness for other clues for teacher-selected materials. Readiness for new learnings was to be fostered continually

and sought through obesrvation of the child in the action setting (i.e., bathing, story time, snack period).

The program was based also on the assumption that the more opportunity a child had for applying workable behavior structures in a variety of selected situations, the greater would be his ability to modify his actions and cope with the environment in which he lives. Through establishing relationships between what he saw or experienced, what he did, or how he responded, the child increased his store of usable symbols as additional vehicles for learning. He also set up patterns for processing the information he obtained so that it was available for use in problem solving.

DEVELOPING RESEARCH STRESSES TEACHER'S FUNCTIONS

Since 1964 when the curriculum was published, research on systematizing instructional approach lead us toward further delineation and refinement of the teaching-learning process, especially in relation to a teacher's function.

For the new R & D Center for the Education of the Handicapped at Teachers College, Columbia University, Dr. Leonard Blackman described as the main objective the triad of determining: 1) the learner's characteristics; 2) the requirements for effective school learning; and 3) the strategies to help the handicapped learner to move toward school success. It is the influence of the work of the Center's staff and the present faculty of our Department of Special Education that is pushing us strongly toward examination of instruction. It is the present effort toward conceptualization that I will discuss this morning.

Clearer Picture Needed

Since special educators, particularly of very young children, serve on interdisciplinary teams in a variety of settings, it seems increasingly important that what is "special" and what is "education" be clearly seen in the teacher's roles, practice, style, tactics, and strategies of instruction. It is obvious then that we need a clearer picture of the varieties of teacher behaviors in relation to the child and the content and skills he must learn.

Whether we deal with the highest or lowest functioning handicapped child, the educator's responsibility rests in instruction which includes the selection of: 1) the content (knowledge, basic skills and subskills, sequences) to be learned; and 2) the teaching strategies: instructional methods and modes, as well as communication input and output. These may be considered education's decision-making parameters.

Some of the principles upon which today's presentation is based are as follows:

1. Teachers respond to the behavior of individual children, rather than function in a predetermined manner to a specific program for children with a diagnosed learning disability *per se*.
2. Instructional processes appropriate for the child are not a mirror image of the psychology of the child, i.e., understanding the child is not synonomous with understanding how to teach him.
3. Attentionality or engagement of the child is central to the instructional process.
4. Each learner has a favorite receptive style, and there is a unique set of mechanisms best suited to control his engagement at a given moment in time. Therefore, the teacher's instructional diagnosis will provide information on the most comfortable and receptive stimuli for the instructional process to be employed for that child at that time.
5. The teacher's instructional role is to achieve a "goodness of fit" between the pupil's functional capacity and preferred learning style, on the one hand, and the organization of content and strategy on the other. The attainment of this match ("goodness of fit") is defined as *individualized* instruction.

The ultimate goal, however, is to move the pupil from individualized to *personalized* instruction in which engagement (attention) control is maintained even through hitherto receptively unfavorable strategies.

Thus, individualization implies the identification of the best "wavelength" between the transmitter (teacher) and the receiver (pupil), while personalization involves the improvement of reception on an increasing number of wavelengths.

Kaleidoscope of Instructional Behavior

The two-step process — toward *individualization* and then toward *personalization* — is facilitated by the Taxonomy of Instructional Treatments, an operative model of the kaleidoscope of instructional behavior. It is upon the development and testing of this Taxonomy that Dr. Abraham Tannenbaum and his staff at the Teachers College, Columbia University Research and Demonstration Center for the Education of the Handicapped and in the Department of Special Education, are directing their attention. Today's presentation is one of our first efforts to share our early conceptualizations outside the home field.

TEACHER-COMPETENCY MODEL

Prior to discussing the Taxonomy *per se,* I should like to present the Teacher-Competency Model which has been developed by Dr. Phoebe Lazarus. As we review the roles of the teacher, I believe our concept of curriculum, or at least curriculum development and implimentation, will become more clear. Considering the teacher essentially as a processor of information, Dr. Lazarus has identified the following seven roles:

1. Teacher as observer
2. Teacher as recorder
3. Teacher as analyzer
4. Teacher as transducer
5. Teacher as transcoder
6. Teacher as transmitter
7. Teacher as evaluator

1. *The teacher as observer*: a) uses an observational schedule to record normal and deviant behavior; b) records ten-minute samplings efficiently, so that any teacher can translate findings for analysis; and c) applies a behavior analysis technique to determine *tentative* hypotheses of developmental levels of child.

2. *The teacher as recorder*: a) administers tests to refine hypotheses (formal and informal), group screening, and individual tests; and b) designs informal tests for purposes of group or individual assessment of specific competencies.

3. *The teacher as analyzer:* a) compiles a summary of behavioral and cognitive aspects of a child's behavior from observations and records (description); and b) is able to set up a profile of these competencies (assessment).

4. *The teacher as transducer*: a) participates in interdisciplinary conferences and interprets own findings to others; b) assimilates into own analysis information and observations from other disciplines; and c) synthesizes this feedback and amends own analysis.

5. *The teacher as transcoder*: a) sets up tentative objectives for instruction of child, regarding short-term goals and long-term goals; b) describes terminal behavior desired for short-term components; c) analyzes tasks; d) analyzes medium (materials for instruction, etc.); and e) makes competent decisions on modes of instruction to attain goals.

6. *The teacher as transmitter*: a) sets up physical environment for effective instruction; b) communicates by appropriate verbal and nonverbal transaction; c) selects and competently uses methods and media in presentation of the concept or skill to be learned; d) instructs

individuals, small groups (2-6), and large class groups; and e) involves each child in instructional transaction.

7. *The teacher as evaluator*: a) uses "feedback" from all functions (1 through 6) to recast any and all approaches; b) uses media for self-study and self-criticism (e.g., tape recorder, film, videotape, computer assistance, etc.); and c) shares successes and failures in teaching-learning experience during group evaluation with colleagues in allied disciplines.

Determining the specific program is indeed a task which each professional group or, better, each professional must determine for the child. Piaget (1947) along with most theoreticians and practitioners concerned with human growth agrees that an organism needs information in order to adapt and develop. It actually feeds stimuli. This information as it applies to the adaptive process can be considered in terms of:

1. The quantity of information available at any one time;
2. its quality, i.e., content or meaning; and
3. the context in which it appears.

Quantity of Information Significant

Apparently of very great importance is the *quantity* of information available to the infant and young child at any one time. Problems result from both too little and too much stimulation. Well known are the studies of chronic deprivation of institutionalization and its universal effect in reducing the child's interest in stimulation and in his adaptation. Provence and Lipton (1962) and also many others observed that institutionalization resulted in great distress for the young child and if prolonged, without an attentive caretaker and sensory stimulation, the child usually becomes apathetic and loses, at least temporarily, his normal capacity for affective expressions. Nor can preschool be a program simply stated in terms of a rich, multisensory stimulating environment. Indeed, we will agree that children seek stimulation and that handicapped young children are particularly in need of enrichment. But as Cronbach (1969) strongly states, the highly stimulating environment usually considered as "rich" promotes optimal growth for some persons and may not be at all suitable for others. He acknowledges the deprivation of an infant who has nothing to gaze upon but a blank ceiling, but suggests that probably nothing is gained by making the environment so richly patterned that he cannot direct his attention.

The pattern that holds a child's attention varies, of course, with age and experience (Frantz, 1961). The appropriate amount of redundancy and detail of an information-laden environment depends

upon the learner's maturity. Wickelgren and Cohen (1962) observed that too much information can actually create an overload which impairs learning. Somehow we must find ways of determining optimal amounts of stimulation, physical assistance and environmental modification, external monitoring and reinforcement, pressure for excellence and accomplishment, conceptual versus concrete activity, etc., for each individual child in his own situation with recognition of deficits and strengths.

Cronbach (1969), while supporting early childhood programs, suggested altering the environment to provide:

1. optimal maintainance environment, i.e., one which promotes nourishment and growth potential; and

2. intervention periods to supply needed skills, alter habits, and overcome physical impediments.

Teacher a Key Evaluator

The extent to which a child needs support upon experiencing discrepancies between his perceptions and his ability to act can be judged only by careful and systematic observations. Hopefully, teachers will be increasingly qualified as knowledgeable observers and recorders of behaviors as well as conscious responders to children's behavior. Educators (teachers) can offer systematic evaluation of the very young child's sensory, effective, and intellectual functioning, including his receptive and expressive modes. As we study the impact of adults' feedback to the child and the mutually active interactions — both positive and negative — we as professional educators should indeed be able to advance the child's development in ways as yet not understood.

TAXONOMIC APPROACH

Now, the Taxonomic approach suggested by Tannenbaum and his Columbia team appears to offer a model to look more closely at the teacher, the transmitter, and at his storehouse of instructional strategies and resources or alternate wavelengths. Central in the instructional process is the child's attention or engagement. If pupil engagement or attention is to be aroused most effectively a given combination of instructional content, communication channels for receiving and transmitting information, and strategies for performing the instructional act is undoubtedly required. For the teacher to employ the appropriate combinations of these factors, he will need a large array of "bits" of information regarding the alternate combinations.

Actually, it appears that information processing is a delicate, complicated task, even when all of the relevant "bits" are available to the teacher. When they are not, the task is an almost impossible one. The incompetent teacher processes few "bits," because few exist in his repertoire. The highly competent teacher, on the other hand, processes few bits because he can quickly eliminate the ones obviously unlikely to succeed. Once these are dismissed, the choices are made from among the few remaining alternatives.

When, for example, a child's response pattern is erratic and unpredictable, it is possible that no combination of instructional stimuli produces optimal engagement on successive trials. The teacher then needs to be adroit enough to shift from one strategy to another, swiftly but smoothly. This requires that his arsenal of strategies be both abundant and systematically organized.

The published Teachers College Experimental Curriculum for Young Retarded Children (1964) contained: 1) a sequence of content; 2) the description of observable behavior representing each level of child function upon which the teacher could usually depend; and 3) a variety of specific activities and strategies which the teacher might employ and which were deemed to have been successful during the experiment. While this curriculum material and the sample activities are still useful, the publication does not provide an organizing index to all possible instructional behaviors.

This new Taxonomic approach structurally takes into account the teacher's function: 1) in organizing content; 2) in transmitting instructional stimuli through any of the pupil's receptive sensory modalities; 3) in eliciting responsiveness through any of the pupil's expressive channels of communication; and 4) in mastering the total range of instructional modes (styles) and methods (pupil grouping arrangements) available to be utilized.

For such a system teaching materials must be categorized according to each of these factors: 1) content (level and sequence of knowledge or skill); 2) children's receptive channels; 3) children's modes of expression; and 4) teaching styles to be employed and teaching method in which the material can be useful.

Through intelligent application of such a classification, teachers need not move from diagnosis of a child's functional capacity to the selection of appropriate instructional materials. Rather, the Taxonomy provides them with a intermediate step. After the diagnosis, the teacher determines the content and the strategy and then seeks materials to fit the contextual and strategic requirements.

Content May Be Plugged In When Desired

The only interchangeable part of the Taxonomic model is content. Any substantive material — information or behavioral — can be plugged in, but it must be organized as a pyramid of successive layers of concepts, each resting on a simpler, more fundamental stratum. To promote personalization of instruction with flexibility and variety of input, the teacher will vary the mode and/or method as appropriate to extend attention and the child's information processing.

You recall my earlier reference to our conviction that we need to secure information about the stimuli which are the most comfortable and readily accepted by the child in the teaching process, i.e., the ones which foster and prolong the child's attention. Essentially, we are saying that the content to be learned would remain constant while the teacher varied the packages and the means of presenting them in response to the child's behavior. Obviously then, the pupil's attentionality is central in the teaching-learning setting. The teacher must make decisions regarding the content and the strategies to be employed; the more handicapped the child, the more options that will be eliminated — or the more important it is that the teacher really know and use all the strategies which stimulate a child's behavior.

Modes and Methods Identified

In other words, it behooves us to identify the possible varieties of modes and methods which constitute the teacher's instructional recources.

Thus far, the "How of Instruction" has been described as including four main headings: Instructional Methods, Instructional Modes, Communication Input, and Communication Output.

The instructional methods (classroom groupings that provide the child with various instructional settings) to which our attention can be directed in planning instructional strategies include:

1. Teacher—Total Group (Involves a setting in which the teacher instructs the whole group.)
2. Teacher—Small Group (Involves a setting in which the teacher is instructing a part of the class.)
3. Teacher—Student (Involves a one-to-one relationship for instruction.)
4. Student—Total Group (Involves a setting in which a student, acting as teacher, instructs or organizes a total group.)

5. Student—Small group (Involves a setting in which a student, acting as leader, instructs *part* of a total group.)

6. Student—Student (Involves an instructional setting in which a one-to-one purposeful relationship exists between two students. The students can be paired with equal or unequal skills, depending upon the teacher's goals.)

7. Individual Self-Instruction (Involves a setting in which the student is personally involved in instructing himself and in which he sets his own pace for learning.)

The second category for instructional variables, called Instructional Modes (i.e., the manner of instruction or the types of formats and styles that provide the students with a varied presentation of materials), seems most often to include the following eight items:

1. Play-Chance (Involves a manner of instruction in which the element of chance is emphasized, e.g., instructional games, in which students have equal chance regardless of their skill.)

2. Play-Competition (Involves a manner of instruction in which the element of competition is stressed, e.g., instructional games, where the student pits his skill against others.)

3. Play-Puzzle (Involves a manner of instruction which presents the student with a problem that can be worked out by means of the student's skills and is particularly adaptable for use in self-instruction.)

4. Test-Response (A specific response required for a particular stimulus by means of which the teacher determines whether the child has learned the content that has been imparted.)

5. Exploration (That style of presentation which requires the child to refer to other sources of information or to his own realm of experience.)

6. Programmed Response (The sequential learning steps are small, the student receives immediate feedback as to the appropriateness of his response. The student is expected to participate in this type of format by himself.)

7. Problem Solving (Presentation of problem situation requires the student to arrive at the appropriate answer through any means of reasoning.)

8. Exposition (Essentially, a manner of instruction which requires verbal presentation of information by the teacher or through printed materials.)

Communication Input

The Communication Input category, defined as the student's sensory channel selected by the teacher for transmission of information, consists of seven items:

1. Visual (Pertains to the sensory input of sight (vision); the stimulation of the sensory system of the eyes through which visual information is transmitted to the student.)
2. Auditory (Involves stimulation of the sensory system of hearing through which information is transmitted to the student. A distinction between extrinsic and intrinsic auditory input is being made. Whenever the purpose is a self-monitoring auditory input, it is so indicated.)
3. Kinesthetic (Involves stimulation of the sensory system which transmits the sensation of movement or tension in muscles, joints, and tendons.)
4. Auditory—Visual (Involves stimulation of the sensory system, hearing, and vision through which information is transmitted to the student.)
5. Visual—Kinesthetic (Involves transmission of sensory input(s) through the eyes and bodily movement of the student; the stimulation of the two sensory systems required to transmit visual and self-movement information to the child.)
6. Auditory—Kinesthetic (Involves stimulation of the sensory systems, hearing and body movement, through which information is transmitted to the student.)
7. Visual—Auditory Kinesthetic (Involves stimulation of the three sensory systems required to transmit visual, aural, and self-movement information to the child.)

Communication Output

The Communication Output (the channel of expression noted or selected by the teacher and utilized by the student to communicate a response) consists of four identified possibilities:

1. No Response (There is an intrinsic reaction to a stimulus which is not visible to the observer.)
2. Oral Response (An answer is given vocally to stimulus.)
3. Motoric Response (A bodily movement or written answer is given by the child in response to a stimulus.)

4. Oral—Motor Response (A written, vocal, or kinesthetic response is given by the child to a stimulus.)

TAXONOMY MODEL REQUIRES DECISIONS BY TEACHER

In using the Taxonomy model, the teacher makes decisions in planning for instruction: three for constant (basic skills, subskills, and level of difficulty) and four for strategy (communication input, communication output, instructional mode, and instructional method). The model itemizes and codes all of the alternatives available to the teacher in making each of these decisions. By placing the selected code numbers in appropriate cells on the Taxonomy chart, he reveals his instructional plan for a given child, a total class group, or a subgroup.

By no means is the use of such a model designed to mechanize instruction. Rather, it is an attempt to select systematically certain instructional modes and methods and tie them into the child's means of communication. It is a way through which teachers can respond to children and permit them the alternatives inherent in their individuality.

For the development of content — that is, the specific basis skills, subskills, and sequence for infants and very young handicapped children — concentrated observation of infants and study of presently existing developmental scales will be necessary.

Encouraged by Serious Work

I am encouraged by the serious work being conducted and initiated in early education throughout the country. I am encouraged also by the willingness to share ideas across specializations and categories. The conceptual framework presented here is an attempt to look a little more directly at the transmitter (the teacher) and his potential for precise instruction for a unique individual.

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GUIDELINES FOR EDUCATIONAL PROGRAMS FOR INFANTS WITH CEREBRAL DYSFUNCTION

Discussion, for the most part, was focused on identifying possible program content based upon practical experiences of the conference participants. The emphasis was on determining some of the unique needs of individual handicapped infants and suggested adaptions in the learning environments. The development of a curriculum for handicapped children from 0 to 2 years was beyond the scope of responsibilities of the conference. However, since the group was comprised of physicians, psychologists, and educators concerned with program development for these children, a wide range of opinion was expressed and a variety of approaches to educational planning was presented.

The ideas liberally shared in the discussion periods seemed to fit into the following seven general statements. It was felt that these points, based upon the conferees' experiences, might serve as guidelines for educators and others assuming responsibility for the education of very young handicapped children.

1. *There is a role for teachers in infant education.* Although parents are the primary educators of infants and very young children in our society, when the child's development is significantly at variance with the norms, there is need for assistance to the parents and planned educational intervention for the child.

Teachers, for example, can assist in fostering attention behavior through carefully planned activities to promote visual, auditory, and tactual awareness. The consistent presentation of meaningful sensory cues such as the conscious moving of the baby's bottle to foster visual tracking is one example.

Teachers can help babies to have experiences which might otherwise have been missed. They can assume responsibility for the selection and modification of materials to foster the child's sensory receptivity and his response. In their work with infants, teachers recognize the interrelationship between sensory input, body posture and control, physical activity, and cognition development. It is easy to see ways in which teachers intervene to promote the child's raising his head or turning it in their efforts to maximize sensory input.

Appropriate kinds and quantity of stimuli will lead to the accomplishment of specific educational goals. Through selected musical

stimuli — colored mobiles, and auditory feedback, for example — the child's efforts to improve body posture can be recognized.

The encouragement of physical activity can be realized through establishing a child's trust in his environment. Special adaptations can be made to help him interact with satisfaction in such an environment.

2. *Special knowledge and skills required by teachers working with very young handicapped children dictate the need for highly trained special education personnel.* One need think only of the effects of a child's inability to move or control his body parts according to usual human patterns which can cause distortion in obtaining information from the environment. Without the employment of appropriate teaching skills, an irreparable void can be created in the continuity of his learning.

Working with children presenting as many multiple disabilities as do infants with cerebral dysfunction is a complex task. There are no predetermined solutions to the specific problems of a specific child. Knowledgeable teachers will be required to observe and record behaviors of the youngsters in a variety of situations, tentatively plan and test educational strategies, and program accordingly. For example, a four-month-old child unable to open his hand became aware of his body part when an ice cube was placed in it. It was concluded that his limited vision and immobile head did not permit the inclusion of his hand in his visual field.

Promoting cognitive, perceptual, sensory-motor, and affective development of very young children with diagnosed or suspected cerebral dysfunction is the major task of the teacher electing to work in this area.

3. Since by tradition, educators have focused on school-age children, *there is need for systematic observation and experience with infants and a thorough knowledge of developmental norms.* With such knowledge, teachers can learn to establish a sense of trust and comfort for the infant. They can handle and hold the baby in close physical contact, they can respond to the child's behavior instead of imposing adult feelings, desires, and objectives, or acting overtly at inopportune moments.

New to most teachers is the all-important close contact in feeding, dressing, diapering, and playing with the baby in a manner secure and comfortable to both.

Staff and other significant adults need a basic knowledge, understanding, and communication about the specific infant and environment designed for him. Awareness of and sensitivity to the mother-

child interaction is particularly important for teachers working with infants. Regardless of the setting in which the teacher works, home visits to observe patterns of living and child rearings will have significant bearing on the teacher's approach to program planning for the individual baby.

4. *Need for a highly individualized program for each child was reaffirmed.* Essential to the program is a sequential, systematic approach to the planning for the child's over-all development with maximum utilization of his assets, as well as intervention to improve function in deficit areas.

It is generally agreed that the range of experiences considered important for all babies should be provided for the handicapped infant. Parents may be expected to react somewhat differently to babies who do not respond or behave as other children do. They can be assisted to understand their child's unusual response, or lack of it, and be encouraged to continue interaction with him and persevere despite limited responsive behavior. Teachers and parents can work together in establishing satisfactory patterns of reinforcement.

Efforts to extend the young child's environment include moving him to places of comfort and interest in his home and in the community with contact, particularly physical, with others in addition to his mother. The notion of the *confined space* for several babies fosters maximum awareness of self and others.

5. *Educational programs for infants take place in a variety of settings.* The role of the educator will vary somewhat according to the program staff available, its orientation, and its physical environment. Since the early development of handicapped babies cannot be the sole responsibility of any one person, ability to interact effectively with a variety of professional personnel is an essential teacher qualification.

Differentiation of teacher role can be clearly made as one considers: (1) the home instructor, who relates particularly to the parent in his own home; (2) the clinic teacher, who is a team member serving parents and their children on an appointment basis or serving in a semi-permanent group setting within the clinic for observational and planning purposes; (3) the special teacher, who is a consultant to the team with primary responsibility in a medical or welfare setting.

6. *Continuity of programming, beginning in the infancy period, is seen as essential to the achievement of appropriate short and long term life goals.* Adult activities with infants require careful selection to promote a continuity of growth and achievement of developmental levels regardless of the child's present function. Attempts need to be

made to foster attainment of the usually accepted developmental norms without concern for evaluations or devaluations based upon chronological age comparisons. Predetermining ceilings on achievement was emphasized as unacceptable.

The increasing knowledge and skills used in determining the child's comfort in movement, the appropriate accompanying verbalization (e.g., reinforcing communication with eating, toileting, playing), providing close tactual contact, and expanding the infant's environment with consideration of both quality and quantity of sensory stimulation should be employed by teachers designing programs to foster the infant's movement through the specified developmental steps.

7. *A specific goal of the infancy programs is readiness for the child's participation in nursery school and kindergarten.* A role of the special education teacher is one also of assisting staff in these educational settings to which handicapped children may be admitted.

First educational efforts are generally one-to-one instructional sessions for the parents and their baby. However, some group experiences might be initiated during the child's first year with a coordinated team of adults concerned about health care, motor activity, personality development, language, and cognitive function. Placement in vertical and/or horizontal groupings will depend upon careful and considered judgement, based upon needs of each infant and his family. Clear delineation of what the child can do, likes to do, and cannot do will assist in planning for a consistent and fruitful environment.

Preparing both the young handicapped child and his family for the larger groups of nursery school and kindergarten requires close teacher liaison with the receiving school before the child's admission to the program, as well as during the transition period. For children entering a program for the nondisabled, continuing interpretation of the child's behavior and consultation with the teacher will probably be necessary. It is clear that the notion of cooperative team planning and programming extends horizontally at each point in his development and vertically as he grows and moves from one teacher and educational setting to the next.

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GUIDELINES FOR IMPLEMENTATION OF EDUCATIONAL PROGRAMS FOR INFANTS WITH CEREBRAL DYSFUNCTION

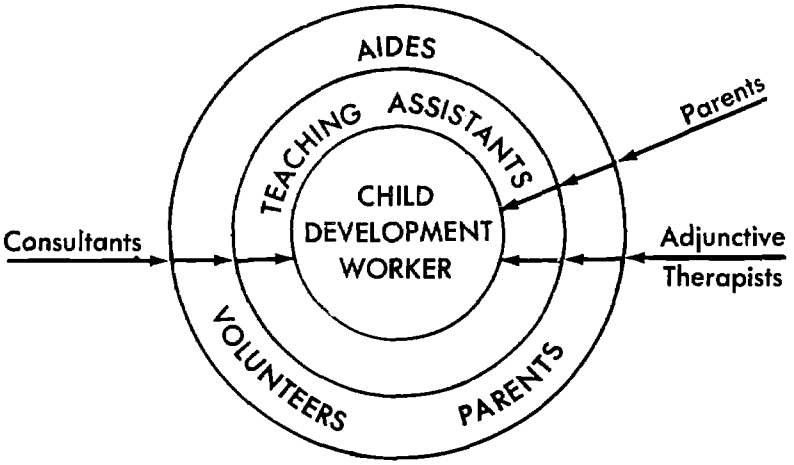
Sources of Programs:

I. Health settings

II. Educational settings

III. Welfare settings

Profile Staffing Model for Infant Programs:



Factors that affect implementation. It is assumed that interdisciplinary cooperation and coordination is inherent in each of these factors

I. Professional Preparation and Training

II. Regulations and Laws

III. Community Resources—Coordination

IV. Family Life Education

V. Public Relations and Public Education

VI. Funding.

I. *Professional Preparation—Training*

A. Who and for what

1. Training of professionals (Where are the resources?)
   a. University-affiliated facilities
   b. Universities with Human Development Programs
   c. Universities with School of Allied Health Services
   d. Continuing education programs
2. Teaching assistants
   a. Two-year programs in community or junior colleges
   b. Vocational-technical schools
3. Aides
   a. Vocational-technical schools
   b. Work-study programs
   c. VISTA, Job Corps, Neighborhood Youth, Career Opportunities Program, etc.
   d. Adult education courses—high school level

B. Strategies

1. Activities to consider:
   a. Initiate workshops, seminars, short courses offered by WICHE, Southern Regional Education Board, voluntary agencies, colleges, Academy for Cerebral Palsy, and other professional organizations such as American Association on Mental Deficiency, Council for Exceptional Children, etc.
   b. Contact with various medical societies and associations
   c. Stimulate cooperation among colleges and training within universities

II. *Laws and Regulations*

A. What to do

1. Initiate activity in changing eligibility criteria that block efforts to develop programs, e.g., considering setting minimal age of eligibility for services at infancy
2. Encourage development of Joint Power Agreements within states and communities to permit public and private agencies to work cooperatively in the area of programming for infants

3. Study and reevaluate licensure laws and regulations which limit implementation of programs as they concern:
   a. Facilities
   b. Personnel (certification and licensure)
4. Study the possibility of reclassification of some civil service positions
5. Stimulate hard data collection in order to determine more accurately what the case will be

B. Strategies

1. The problem of how to institute change in eligibility criteria for services might be referred to the Governmental Activities committee of such agencies as United Cerebral Palsy Associations, Inc.
2. The Governmental Activities committee might address the problems associated with changing existing licensure laws and regulations which limit implementation of infant programs. This would include both facility licensure and certification of personnel

III. *Community Resources — Coordination*

A. General areas of community resources to be considered:

1. Facilities—Where might programs be established? Possible locations are: UCP centers, Child Development centers, Easter Seal centers, MR Regional centers, Head Start, and Day Care centers
2. Professional consultants
3. Auxiliary and supportive services such as Crippled Children's services, Maternal and Child Health services, Diagnostic clinics, University affiliated facilities
4. Organizational relationships, i.e., Nursery School associations, PTA's, Early Care councils, Child Study associations

B. Unmet needs

1. Data and information collection, storage, and retrieval
2. Development of a referral — follow along — protective system

C. Strategies

1. Refer problems of how to tie into data collection storage and

retrieval systems to UCP Task Force on Evaluation. Starting points might be: Council for Exceptional Children, Educational Resources Information Center, Division of Mental Retardation, HSMHA

2. Refer the problem of how to pull out incidence information from the Collaborative Study on Cerebral Palsy and Related Disorders, National Institute of Neurological Diseases and Stroke, to UCP Task Force on Early Care
3. Refer to Early Care Task Force the production of a "How to . . ." publication on where affiliates need to turn among community resources for the identification of a case load, e.g., High Risk register, Child Development clinics, UAF's, MR Regional centers, etc.
4. Refer to Early Care Task Force the problem of development of criteria

IV. *Family Life Education*

A. Four levels of "parent-need" involvement were identified:

1. General information needs
2. Instruction in skills and techniques
3. Therapeutic intervention and instruction in specific techniques
4. Parent involvement in the program process — planning and execution

B. Strategy

The UCP Task Force on Early Care might assume a major responsibility for the development of protocols for meeting the above needs. The role of parents should always be specified in programming

V. *Public Education*

A. Attitudes that focus attention on the need for working with very young children should be fostered, and experience from present programs should be utilized in a variety of ways:

1. Capitalize on general interest in the press and women's magazines on education for the very young
2. Stress statements at the national level concerning the intention of giving priority to education programs for very young children

3. White House Conference on Children and Youth

B. Strategy

1. This problem should be referred to the PR committee
2. Program department and Washington staff should continue to press for involvement of UCP in the White House Conference

VI. *Funding*

A. Three major areas of funding are noted:

1. Funds for training professionals and assistants
2. Funding of the program to be offered
3. Funding of research and demonstration projects
4. Development of accountability techniques, including cost accounting and cost benefit evaluation of programs

B. Strategies

1. Basic funding for core training should come from regular university budgets
2. Consider federal resources for special project monies and for traineeships, e.g., U.S. Office of Education and Office of Economic Opportunity
3. State funds should be encouraged for aide training in vocational-technical programs
4. Funds for continuing education on re-training should be sought
5. Instructional Materials Centers (funded under U.S. Bureau of Education of Handicapped) provide consultants for instruction in using special education materials
6. Funds for research in education could be sought from the Bureau of Education for the Handicapped, Division of Research
7. Other voluntary agencies, such as Easter Seal and private foundations, are also possible sources for funding

COMMUNITY IMPLEMENTERS:

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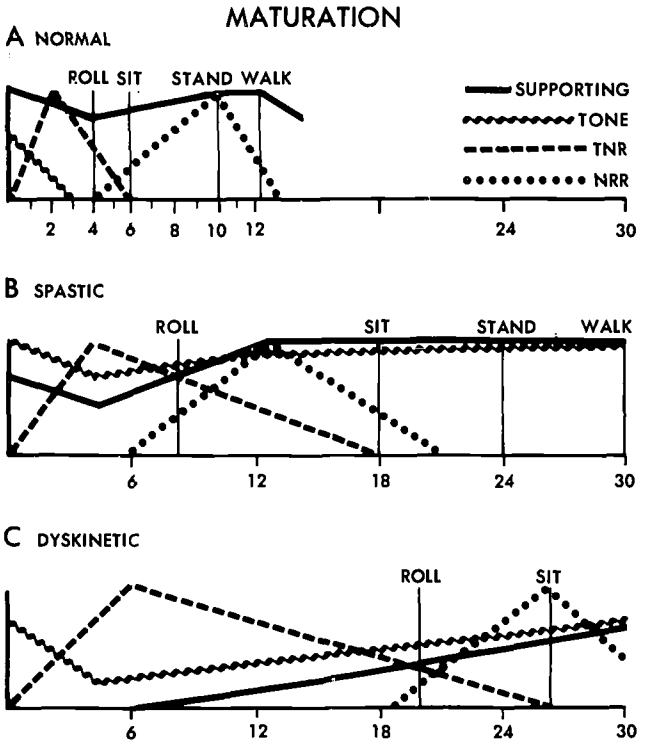
APPENDIX

Developmental Milestones for Normal, Spastic, and Dyskinetic Children



Developmental milestones occur as the state of tone and necessary reflexive movements permit. (A) *Normal.* Walking is possible when tone is equally distributed, tonic neck and labyrinthine reflexes are inhibited, and positive supporting reactions are fully developed. Many postural adjustment reflexes, not shown, are necessary for this complex action. (B) *Spastic.* Delayed onset and inhibition of reflex responses prolong the attainment of walking; (C) *Dyskinetic.* Marked delay in reflex development results in severe motor retardation, and failure to achieve walking.

From Giliette, Harriet E. *Systems of Therapy in Cerebral Palsy.* Springfield, Illinois: Charles C. Thomas, 1969. Used through courtesy of author and publisher.

SEQUENCES OF DEVELOPMENT IN THE HUMAN INFANT
SELECTED REFERENCES

Margaret H. Jones, M.D., 1970

I. SCREENING PROCEDURES

References	Age Group	Comment
The Denver Developmental Screening Test Frankenburg, W. K., & Dodds, J. B. Pediatrics 71:181-191, 1967	2 weeks-6.4 yrs.	Chart showing average ranges for gross, fine motor, adaptive, language, personal-social skills. Based on 1,063 healthy children
Physical and Adaptive-Social Development from Birth to 56 weeks. Fig 4-2, p. 122 in Cerebral Palsy and Related Disorders Denhoff, E., & Robinault, I., McGraw-Hill, 1960	Birth-56 weeks	Chart indicating motor, visual, hearing, speech, and social factors
A Developmental Screening Inventory for Infants. Knobloch, H., Pasamanich, B., Sherard, E. S., Pediatrics 38:6, Part II. pp. 1095-1108, 1966	4 weeks-18 months	
The Developmental Progress of Infants and Young Children, Sheridan, M.D., Ministry of Health: Reports on Public Health and Medical Subjects #102 — Her Majesty's Stationery Office, London, England, 1960	Birth-5 yrs.	Gross motor skills, pp. 97-100 Fine motor skills, p. 101 Speech Development, pp. 102-104
Cerebral Palsy — The Preschool Years, Denhoff, E., Thomas, 1967	2-7 years	

II. TESTS REQUIRING SPECIAL TRAINING

References	Age Group	Comment
The Reliability of Bayley's Revised Scale of Mental and Motor Development During the First Year of Life. Werner, E. E., & Bayley, N., Child Development 37, 39-50, 1966	Birth to 30 months	Manual and Test kit available only to psychologists. Write: The Psychological Corporation, 304 E. 45th St., New York, N.Y. 10017
Comparison of Mental and Motor Test Scores for Ages 1-15 months by sex, birth order, race, geographic location, and education of parents, Bayley, N., Child Development 36, 379-411, 1965	1-15 months	
Measurement of Intelligence of Infants and Young Children. Cattell, P., Psychological Corporation, 1960	3-30 months	Manual available through The Psychological Corp. (see above)
The Abilities of Babies, Griffith, Ruth, Univ. of London Press, 1954	1-24 months	Scales for locomotor, personal social, hearing, speech, eye-hand coordination and performance
Developmental Diagnosis, Gesell, A. & Amatrada, C. S., New York, Hoeber, 1954	Birth-Preschool years	

III. POSTURAL AND RIGHTING REFLEX DEVELOPMENT

References	Comment
The Evaluation of Postural Reflexes in Normal Infants and in the Presence of Chronic Brain Syndromes, Paine, R. S., Brazelton, T. B., Donovan, D. E., Drorbaugh, J. E., Hubbell, J. P., Sears, E. M. Neurology 14, 1036-1048, 1964	Charts appearance and disappearance of reflexes
The Evaluation of Infantile Postural Reflexes in the Presence of Chronic Brain Syndromes, Paine, R. S., Developmental Medicine and Child Neurology 6, 345-361, 1964	Indicates common distortions of sequences in children with central nervous system abnormality
Routine Developmental Examination in Normal and Retarded Children, Milani-Comparetti, A., Gidoni, E. A., Developmental Medicine and Child Neurology 9 (5), 631-638, 1967	Relates sequence of postural and righting reflexes to locomotor development
Systems of Therapy in Cerebral Palsy, Gillette, H. E., Thomas, 1969	Diagrams p. 32, Fig. 12, illustrate distortions in postural and righting reflexes common in children with spasticity and those with athetosis

IV. BOOKS AND MONOGRAPHS ON CHILD DEVELOPMENT—DEVELOPMENTAL SEQUENCES PRESENTED AND DISCUSSED

References	Comments
A Neurological Study of Newborn Infants, Beintema, D. J., Prechtl, H. F. R., Clinics in Developmental Medicine #28, Spastics International Medical Publications in connection with William Heinemann Medical Books Ltd., 1968	A very thorough study of the neurological findings of normal infants and those with various types of abnormalities in the first 9 days of life
An Introduction to Individual Assessment in the First Year, Illingsworth, R. S., Clinics in Developmental Medicine #3, Spastics International Medical Publications in connection with William Heinemann Medical Books Ltd., 1968	Well illustrated, short presentation useful in clinical evaluation
The Development of the Infant and Young Child—Normal and Abnormal, Illingsworth, R. S., 3rd Edition, E. & S. Livingstone Ltd., 1967	Book discussing various aspects of development as well as including tables of sequences of various aspects of growth—many pictures
The Growth and Development of the Prematurely Born Child, Drillien, C. M., E. & S. Livingstone, 1964	Excellent follow study of premature infants

The Neuromuscular Maturation of the Human Infant, McGraw, M., Hafner Publishing Co., New York, 1963

A small volume but a masterpiece. It is based on serial movies as well as clinical observations

The First Two Years—A study of Twenty-Five Babies,
Vol. I—Postural and Locomotive Development
Vol. II—Intellectual Development
Univ. of Minnesota Press, Minneapolis, 1931

A carefully carried out study, well presented

Infant and Preschool Mental Tests, Review and Evaluation, Stott, L. H., Ball, R. S., Monographs of Society for Research in Child Development 30:3, Serial #101, 1965

An excellent compendium for reference

NOTE: The authors gratefully acknowledge assistance from Charlotte Loring, Ph.D., in selection of the reference list.

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UCP:1M:970

The Western Interstate Commission for Higher Education is a public agency through which the 13 western states work together

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