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AN INVESTIGATION OF THE RATIONALE FOR
THE USE OF PERCEPTUAL-MOTOR PROGRAMS
AS REMEDIAL TREATMENT

by

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A RESEARCH PAPER
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Introduction

Researchers in the area of child development have identified and labeled stages in the growth and development of the normal child. Intensive studies regarding the age level and sequential appearance of specific behaviors have been published by such authorities in the field as Bayley, Cattell, Gessell, Ilg and Ames, Piaget, Olson and others.

For the most part, these studies have dealt with normal growth and development. The growth component of this process is a biological construct but can be and is influenced by the environment, whereas the developmental aspect depends heavily on environmental structures in order to progress, not, thereby denying the biological underpinnings.

The emphasis of this paper is on the development process which Bowers defines as a "combination of maturation and learning."
This developmental process begins in the infant with motoric responses. "The first learnings in the human organism are motor learnings." Not only is this view overwhelmingly supported by child psychologists, but also fundamental to the developmentalist.

Such thinkers as Barsch, Montessori, Kephart, Getman, Cratty, and Delacato all agree that motor learnings are fundamental kinds of experience that have great significance for the developmental-cognitive processes.

In view of these basic assumptions this author has examined the current literature to find a rationale for the education of the handicapped child in regard to his perceptual-motor developmental gaps.

It is common knowledge that severe motor and/or sensory impairments do not necessarily result in retardation and/or learning problems that cannot be overcome. Such persons can be of normal intelligence and highly educated. A case in point is Helen Keller. Also numerous motorically limited persons such as those with cerebral palsy, whose develop-

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11 Newell C. Kephart, Slow Learner in the Classroom, (Columbus, Ohio: Charles C. Merrill, 1960).


ment never proceeded through the normal sequence have, nevertheless, reached high levels of academic achievement.

However, this paper concerns itself with the pre-school youngster who because of poor motor development and/or other "non-normal" behavior is considered "handicapped." It is thus assumed that such children have not passed through the normal developmental sequence which most psychologists feel is imperative for normal learning to occur.

When using the term "handicapped child" in this report it will include youngsters who are brain-injured, emotionally disturbed, visually impaired, auditorially handicapped, intellectually subnormal, neurologically handicapped, and those suffering from some motor imbalance. The handicap may be single or multiple.

Some of the questions investigated in the search of literature for an educational rationale for the "handicapped child" in regard to remediating his perceptual-motor problems were:

What is the perceptual-motor process?

How many children are handicapped by deficiencies in the perceptual-motor areas?

Is a sequence of perceptual-motor developmental skills discernable?

Must all phases of the perceptual-motor developmental sequence be mastered?

Are some phases more necessary than others?

How are these developmental deficiencies assessed?

What attempts are being made to remediate the perceptual-motor deficiencies in children?

What empirical evidence is available to support a causative relationship of motoric development to intellectual functioning?
Summary

The appearance recently, of numerous programs which have perceptual-motor orientation prescribing specific activities for the handicapped child has led this investigator to question the rationale underlying these "utopian cures."

In view of the incredible amount of available material and the daily appearance of "new" techniques and/or methods advocated, the research reviewed herein will be neither total nor exhaustive.

Historical Perspective

The concept of physiological education dates back to Jean Itard, to Paris at the end of the eighteenth and the beginning of the nineteenth centuries, when the "Savage of Aveyron" was deemed curable.


Dr. Maria Montessori\footnote{Montessori, loc. cit.} in her original works quotes from the two previous authors when stating the rationale for her "method".
Even though the technique of perceptual-motor orientation as an important basis for the learning process is not a new idea, its frequent appearance in educational research since the 1960's is somewhat astounding. Magdol gives a thorough picture of the historical emergence "of teaching methods involving movement organization and/or sense training." 18

Dr. Newell C. Kephart 19 has been prominent among advocates for perceptual-motor training as a foundation for educational advancement of children with learning problems. His work at Purdue University has mushroomed into voluminous publications.

Other outstanding educators espousing the cause are Dr. G. N. Getman, 20 Carl Delacato, 21 Ray H. Barsch, 22 Marianne Frostig, 23 Bryant Cratty, 24 and Dr. Robert Valett. 25

Definition of Terms

Perception - the receiving of information by the organism from the environment through the senses.


19 Kephart, loc. cit.

20 Getman, loc. cit.

21 Delacato, loc. cit.

22 Barsch, loc. cit.


24 Cratty, loc. cit.

Information refers to a message or a stimulus which is apprehended. The organism is the human person capable of receiving messages. The environment consists of the internal and external world of the individual.

The senses include movement and the five organs of sensation whereby input of information is possible.

Motor Response - the active movement of an organism as a result of a stimulus.

Perceptual-Motor Coordination - the information received through the senses translated into action or the resulting activity of such information. This combination requires that perceptual and motor activities operate at advanced levels. If either set of skills is defective the interaction will be deficient.

Piaget employs the term "sensory-motor period" when referring to "perception and motor activity." According to Wolinsky, "he has indicated that perceptual activity is an intimate part of the sensory-motor period and sensory-motor intelligence." He further defines perception as "the knowledge we have of objects, as of movement, by direct or immediate contact."

Doctor Veit, a psychiatrist, defines perception as "a mental process which gives particular meaning and significance to a given sensation."


27 Ibid.

28 Ibid.

Perception as viewed by the preceding authors is a more developed and advanced concept of the basic process than most educators would portray.

This advanced idea of perception involving mental processes is, in part, due to the framework from which Piaget and Veit operate, i.e., both are skilled in discerning mental behaviors, whereas, educators are more concerned with the basic, fundamental ingredients of the perceptual process.

Ray Barsch, for example, "views the sensitivity system of man as a prologue or introduction to perception and the process of cognition." He expands this concept by differentiating between "perceptual terms" and "function of the organs", e.g., sight and vision, hearing and audition, etc.

"Perception and cognition have been generally regarded as two separate performance entities in human behavior." Barsch holds that it is more realistic to consider the "perceptocognitive fusion" as one process.

Kephart, like Barsch, views basic sensory data as perception.

The meaningful qualities of perception are added on to the sensory data through learning. It seems possible that this learning takes place largely by means of the observation of sensory data and changes in sensory data as motor explorations are carried out.

Both Barsch and Kephart emphasize the importance of movement as a prime means of gathering information from the surrounding environment. This movement information is "matched" with incoming sensory data.

Montessori, on the other hand, places more stress on the "sensory

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30 Barsch, loc. cit.
31 Ibid.
33 Montessori, loc. cit.
training" of the young child with "muscular education" getting attention but only as a follow-up or extension of the sensory data-receiving systems. However, Montessori lists "motor functions" as fundamental in that she defines this function as that "by which he [the child] is to secure his balance and learn to walk and to co-ordinate his movements." The act of "receiving sensations from his environment" she labels "sensory functions."34

Two other experts in the field of education, Frostig and Getman, deal with a more specific kind of perception, namely visual-perception. Their contributions will be included in the following pages, but such specificity is not pertinent at this point.

The magnitude and variety of disabilities which children exhibit seem to demand that educators develop some convictions concerning the possible needs of "handicapped" youngsters and ways of treating them.

Theories of Perceptual-Motor Development

The normal developmental sequence of motor skills from infancy through early childhood is predictable within a range. Bowers observes that "the specified motor achievements for a given chronological age on most developmental scales represent the average range of age in which these skills are developed."35

Olson, too, holds that "motor sequences tend to be fixed and invariable as to order. However, the timing of the appearance of each event...

34Montessori, loc. cit.
35Bowers, loc. cit.
shows dramatic diversity in the human material." Bayley's study supports this unevenness of rates in individuals. The amount of time spent by the individual in each stage of development varies considerably.

The maturation of the individual most certainly affects both the sequence and the rate of growth, as does the opportunity to learn. Some skills may develop or never develop depending upon the presence or absence of the opportunity for learning them.

Development is, however, much too complex to be packaged into neat steps in which the child abruptly ends one level of performance and moves immediately to the next. A more accurate description is one in which there is a gradual reduction in certain movement behaviors and the gradual appearance of more advanced actions.

Bowers sees the motor developmental process as a "spiral stairway." Piaget, the eminent developmentalist, also subscribes to the concept of stages.

Simple movements and patterns normally precede and become supportive of the higher levels of performance. The sequential aspect, however, is not so determined as to preclude the appearance of the next highest level skills occurring simultaneously.

Regardless, the developmental motor sequence should be mastered to ensure normal development and readiness.

Under normal conditions, environmentally and from the organism's

36 Olson, loc. cit.


38 Bowers, loc. cit.

39 Bowers, loc. cit.

40 Piaget, loc. cit.
point of view, the child in our society is assumed to be ready for school or academic activities by the time he reaches chronological age of six.

Valett summarizes the consensus of opinion of most educators that "much prior preparation and development are necessary before a child can successfully learn typical school subjects." 41

In complete agreement with this view would be Kephart who has one of the most systematic and orderly theories of the child's perceptual-motor development. He holds that stages are "hierarchial" with each stage being "essential to the next stage." 42 He sees "development in the child, not so much as a sequence of acquisition of specific skills and performances, but as the sequential development of certain basic generalizations." 43

Through his first motor explorations, the child begins to find out about himself and the world around him. These motor experimentations and motor learnings become the foundation upon which subsequent learnings are built. It is logical to assume that all behavior is basically motor and that the prerequisites of any kind of behavior are muscular and motor responses. Therefore, it is to be expected that the first generalizations which the child learns are motor generalizations. 44

These generalizations are developed by a combination of "patterned differentiation of specific elements out of a generalized mass" and "a patterned integration of specific elements into a structured whole." 45

41 Valett, loc. cit., p. 129.


43 Ibid.


(the latter being reflex responses). The resulting "movement or motor patterns" free the child so that attention can be focused on the purpose of the act rather than on the act itself.

Once the motor information begins to be systemized in this fashion, perceptual data which are being received can be "matched" to the motor learnings. This, Kephart calls the Motor-Perceptual Stage.

The next stage is similar but the emphasis is on the perceptual information and "motor information is used only to confirm or augment."

This is the Perceptual-Motor Stage.

In considering the motor learning which is so basic, Kephart gives particular attention to the concepts of "laterality" and directionality. Laterality he defines as "the awareness within the body of the difference between the left and right...It is this left-right gradient which will become the basis for his [the child's] concepts of the coordinates of space."

However, Kephart cautions that laterality should not be confused with handedness. "Handedness is a recognition of position outside the body."

Once the perceptual-motor matching begins to occur directionality develops.

The three coordinates of Euclidian space (right-left, up-down, before-behind) are developed within the body first as a part of its motor patterns and then projected onto outside space. This process of perceptual projection is directionality. Only through such projection can outside objects come to have spatial dimensions.

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49 Kephart, "Brain-Injured Child in the Classroom," p. 15.
The Perceptual Stage is the succeeding one. At this level of operation as perceptions are compared, "relationships between the two objects can be deduced."\(^{50}\)

"The formation of adequate concepts can be considered the goal of a long process of sequential development."\(^{51}\)

As our knowledge of the developmental process increases and as methods for training the child at the more basic stages of development become available, the school will inevitably be asked to undertake such teaching. It matters not whether we call it academic, such training is becoming a responsibility of the school. We must, therefore, recognize the vital nature of these earlier foundations for perceptual learning and not neglect them in our haste to move on to symbolic activities.\(^{52}\)

Dr. G. N. Getman, an optometrist by profession, concurs with Kephart in placing great emphasis on "readiness for learning." Both view this readiness as having a strong physiological base.

In one of his earlier publications, \textit{How to Develop Your Child's Intelligence},\(^{53}\) Getman lists six sequential areas involved in the total developmental process of a child. They are:

1. General movement patterns
2. Special movement patterns
3. Eye movement patterns
4. Communication patterns
5. Visualization patterns

For Getman, as would be expected of an optometrist, "vision becomes the link between the activity and comprehension."\(^{54}\)


\(^{51}\)Kephart, "Brain-Injured Child in the Classroom," p. 16.

\(^{52}\)Ibid., p. 17.

\(^{53}\)G. N. Getman, \textit{How to Develop Your Child's Intelligence}, (Luverne, Minn., 1957).

\(^{54}\)Ibid.
A later publication by Getman written in cooperation with three colleagues states, there are "four Learning Arts" which are presented in the order that the authors now consider a developmental sequence.

But, again these four Arts "are interrelated...through vision, which is a factor common to all...Emphasis on the visual aspects of each of the following areas of performance is required."

"Art of Movement"--the information gained by moving; the goals and relationships of such actions; the practice and recall of these actions.

"Art of Orientation...knowing where he is." This area includes explorations and curiosity-satisfaction; "early concepts of direction, distance"; integration of visual and movement systems.

"Art of Identification -- organization of things and people and their very specific meanings to a child himself." The grouping of experiences into units of later comparison followed by labeling, once speech begins to develop, constitute the basic operations of this Art.

"Art of Communication" -- Speaking and listening skills are a part of this area. The common bases of things, the transmission of feelings and the growth of the thought processes finish out this aspect of the developmental sequence.

Getman's notion is that of the "total child" who "must interact in order to be ready to learn."

The total child is an "action system" which operates to gain freedom and skill in all movements available to him. Important to this "action system" is a guidance system which serves to steer movements toward their goals.

This guidance and appraisal system is known as vision.


56Ibid.
Another expert who places emphasis on the visual aspect of the learning process is Marianne Frostig. However, she relies on Piaget's theory that perception is the major developmental task of the child between the ages of three and seven years of age.\(^{57}\)

Piaget\(^{58}\) sets periods of stages of development which have implications and rich possibilities for educational practice. Most of his theory, however, is presented with a strong philosophical orientation. He lists six stages in the sensory-motor period, all of which deal with the senses and sense perception, with little attention to the motor aspects of learning.

White says that "defining intelligence as the prime human adaptive tool, Piaget traced the etiology of this vital asset from its first manifestations in the sensory-motor behavior of the newborn to the emergence of ideational forms at the end of the second year."\(^{59}\)

Dr. Montessori's Own Handbook, likewise, gives much attention to sensory education and includes language. She lists motor education as part of her method but considers it "the primary movements of everyday life (walking, rising, sitting, handling objects)".\(^{60}\) Her techniques presume that adequate perceptual-motor abilities are already present in the child.

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\(^{58}\) Piaget, loc. cit.


\(^{60}\) Montessori, loc. cit.
At the other end of the continuum Ray Barsch adheres to a theory of human development which "is initially activated as a basic training ground of extensive movement and limited cognitive efficiency." He admits, however, that further development reverses this situation, with the emphasis shifting to cognitive development and away from movement activities.

Barsch's "movigenic theory" is elaborately developed with ten constructs. However, this "movement totality" includes "physiologic, social, psychological, neurological and chemical movements." In essence his ten constructs follow this order:

1. Man is made to move "efficiently."
2. The purpose of efficient movement is for "survival."
3. Movement is organized by the organism's perceptions.
4. The "percepto-cognitive system" provides information for movement.
5. The organism moves in space.
6. Developmental momentum provides the organism with impetus for growth.
7. Efficient movement must have stress.
8. An adequate "feedback" system promotes development.
10. Movement is communicated symbolically through language.

Barsch's writings are technical but he translates the philosophical aspects into pragmatic curriculum modifications. For Barsch, movement is the core of the developing organism.

This emphasis on movement is also discernable in the Theory of Neurological Organization commonly called the Doman-Delacato Approach. The basis of this theory is the neurological ontogenetic development of the total central nervous system. "Man's neurological organi-

[61]Barsch, loc. cit., p. 63
[62]Ibid., p. 36
Man's physical abilities, proceed through four main stages of development governed at four levels of the brain. The infant's simplest movements in the short period following birth are governed at the level of the medulla and the spinal cord; the ability to crawl comes later, along with the development of the next higher brain center, the pons. At approximately nine months neurological development extends to the level of the midbrain. In terms of mobility this is typified by "cross-pattern" creeping. This orderly progression of myelination moves on to the cortex at about one year of age when walking begins. The walking pattern is gradually refined until about the age of three or four, it, too, becomes "cross-patterned." The final lateral progression, called cortical hemispheric dominance, takes place at the level of the cortex and is the process of making one cortical hemisphere dominant over the other. When the dominant-subdominant relationship is achieved the organism is complete and the problems of communication theoretically overcome. 64

Delacato sees Neurological Organization as a "sequential continuum," during the course of which, "no level can be skipped or slighted." This continuum ends at the age of six to eight years... and forms the basis of human perceptual abilities. 65

Summary

The above considerations all point to the obvious conclusion that growth and activity are inseparable components of the developing child. Movement is a basic need of all children.

The theorists cited herein, basically agree that an ordered sequence of growth and development is not only discernable but a pre-requisite for

64Ibid., p. 474
normalcy. Each has a particular bias or frame-of-reference whereby hypotheses and tenets are proposed. However, semantics and personal biases prove to be barriers in arriving at a total picture of the developing organism, acceptable to a large number of authorities.

In spite of such seeming confusion the resulting variations in techniques and approaches add depth and flexibility to the area of remedial intervention.

**Appearance of Problems in Learning**

The number of children who exhibit characteristics of some type of neurological insult or developmental disturbance is estimated by Kephart as being as high as 20 to 22 per cent "among the normal school population." Another survey reported by him "found that 17 per cent of the normal school population displayed this problem in sufficient degree to cause significant reductions in school achievement or to make such achievement extremely costly to the organism."

Le Winn, et al. hold "...it is a reasonably conservative, educated guess that at least a million youngsters under 18 years of age in the United States have obvious handicaps because of brain-injury."

This author concludes that the large number of children who are plagued with learning problems hovers around 15 to 20 per cent of the school age population.

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67 Ibid.

The foregoing theorists hypothesize and conjecture concerning the occurrence of children with learning problems. The causative factors of inadequate functioning are legion and difficult, if not impossible, to ascertain, even with recourse to available research and relying on experience.

The child who is mentally retarded and/or neurologically handicapped begins with an organism that is not intact. It is readily credible, therefore, that such a child may not be able to ascend the stairway of normal developmental skills. His learning may be patchy, resulting in the presence of motor problems, or it may, on the other hand, not result in such overt behavior. The disability may be more subtle.

The disruption of the developmental sequence may result in the young child's entering the educational system "with a lesser degree of skill and ability in one or more areas than the educational curriculum assumes." Thus, he finds himself inadequate for the tasks presented to him.

Kephart's summation of the problem states that "since later learning is based in large degree upon these earlier learnings...better school achievement could result if the pre-school learnings in which he [the child] is weak could be strengthened so that he would have a more solid base for school learning." The disruption of the developmental sequence, or the failure to master the patterns, whatever the cause, does not halt the progress of the organism but results in basic inadequacies involved in the more complex motor tasks which follow. Bowers maintains:

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69 Kephart, The Slow Learner in the Classroom.

70 Ibid.
This does not mean that a child failing to acquire the neuromuscular coordination necessary for efficient cross pattern creeping will not learn to walk but rather that his walking performance will be less coordinated than it might have been and the more complex locomotive skills such as running, leaping, and jumping will be even more noticeably lacking in proficiency. 71

As a consequence of this position Bowers focuses on the movement aspect of the developing child. Most of his work relates specifically to the mentally retarded child and yet he notes "deficient motor development occurs in a surprisingly large number of children of normal intelligence." 72

The outgrowth of Bowers' convictions is a program of motor developmental activities for the mentally retarded. In his words:

The program of motor developmental activities can best be described as an approach to providing a series of movement experiences which are developmentally sequentially arranged so that the participant will experience as few failures as possible, and the presentation of new movement patterns will be meaningful in regard to those which comes before and after. 73

It is this same "pattern" concept that is of such import to Kephart. He defines motor patterns as opposed to motor skills. "The motor pattern ...stresses the purpose of the act, the outcome of the movement," while the "motor skill implies the development of high degrees of precision in specific activities or groups of activities." 74

The movement pattern can be conceived and set into operation while the organism attends to the reason for the act.

71 Bowers, loc. cit.

72 Louis Bowers, "Motor Developmental Activities for the Mentally Retarded," Division of Physical Education, College of Education, University of South Florida, Tampa, Florida, p. 6 (Mimeographed)

73 Ibid.

74 Kephart, "Brain-Injured Child in the Classroom", p. 10.
If the focus of the child must be on the action, then little knowledge can be gained from the accomplished task. The motions are made with little or no comprehension of the activity.

In writing of the brain-injured child Kephart acknowledges the difficult and complex process of developing movement patterns. It depends on "a quantity of responses...upon an organization of these responses. Responses must not only exist but interconnections between them must be preserved."75

Interference at some point during the process of developing patterns, renders the next step difficult for a particular child (brain-injured or non brain-injured). Due to the inability to assess this difficulty, outside pressures demand that the child continue to advance. "His blocked learning is not recognized...pressures become so strong that a temporizing adaptation is necessary...He learns to manipulate this part in the manner required...He develops a splinter skill...[which] has little or no connection with anything else which is going on in the organism."76

Kephart cites an example of such a case exhibiting the foregoing problem. It translates the previous theorizing into a concrete situation. His conclusion of the case is that, "it was necessary,...to go back to the point where differentiation had departed from pattern, restore the sequence and help him [the boy] to develop a structure of movements."77

75 Ibid., p. 5.
76 Ibid., pp. 5,6.
77 Ibid., pp. 6,7.
Kephart asserts his ideas on the remediation of the problem-learner very succinctly when he says: "If we wish to teach at a level higher than this breakdown, we must repair the damage and lay the foundation." 78

To assess and later remediate at the point of developmental disruption Kephart and Roach have developed The Purdue Perceptual-Motor Survey.79 Techniques for repairing developmental gaps receive a thorough exposition in the second half of Dr. Kephart's, Slow Learner in the Classroom.80

In line with this return to the point of developmental breakdown the Institute for Achieving Human Potential under the direction of Carl Delacato and Glenn Doman ascribes to a similar theory. However, the Doman-Delacato Theory is more of a biologic-neurologic oriented one.

"Those areas of neurological organization not completed or absent can be developed by passively imposing them upon the nervous system, thus helping brain-injured children to perform at normal levels and normal children to increase their mental abilities."81

The obvious difference between Kephart's theory and the Doman-Delacato one is that the former requires that a pattern be formed so that attention may be shifted to the purpose of the act, while the latter considers it sufficient to form the pattern by imposing it on the organism.

Delacato says: "Treatment is based on the assumption that experience

78Ibid., p. 17.


80Kephart, The Slow Learner in the Classroom, loc. cit.

affects the brain...[and] that specific types of experience will affect specific levels of the brain."\textsuperscript{82} Therefore, the child who is not neurologically organized is "patterned" or specific developmental experiences are prescribed for him.

To develop the degree of Neurological Organization which is adequate the "extent and quality of \textsuperscript{83} Neurological Organization" must be assessed. Delacato has devised a rating scale for this in terms of neurological months--"The Doman-Delacato Development Profile".

Once the level of development is ascertained, a specific program is organized. The structure therein is rigid and demanding, with emphasis on movement and the senses. In addition, the activities have time requirements attached.

Bryant Cratty reviews and criticizes the Doman-Delacato Theory, principally on Delacato's "assumption that the central nervous system is being trained by motor activities."\textsuperscript{84}

Cratty, himself, recognizes the importance of motor activities in the developing child but asserts that "rather than preoccupation with the neurological underpinnings of motor activities, it is suggested that the educator ask himself with what kind of perceptual-motor activities does the child have difficulty? After this has been established, the educator should then attempt to rectify the deficiencies through the application of perceptual-motor sequences carefully graded in difficulty and appropriate

\textsuperscript{82}Delacato, loc. cit., p. 24.
\textsuperscript{83}Ibid., p. 17.
\textsuperscript{84}Cratty, loc. cit., p. 132.
to the ability levels the child exhibits."\textsuperscript{85} His published work to aid the
educator in this task is \textit{Developmental Sequences of Perceptual-Motor Tasks}.

In most of his works Cratty makes a point of the paucity of scholarly
and reliable research to substantiate any particular program for remedial
purposes. Likewise, he makes known that "it is believed \textit{by the author}\nthat perceptual-motor activities constitute an important part of the
educational program for exceptional children."\textsuperscript{86} These perceptual-motor
activities do not thereby "constitute magical panaceas for children with
mild or severe learning difficulties."\textsuperscript{87}

In a similar vein he deplores the following of "movement messiahs."
However, he repeatedly affirms "it is apparent that gross bodily movements
represent an important learning modality which has not been fully exploited
by educators."\textsuperscript{88}

Getman would agree with the previous author for he states that
"present indications in research relating to the development of perception
in humans, the guidance, control, and the appraisal of one's own movements
through space are actions of great intellectual importance."\textsuperscript{89}

In order to develop the previously discussed Four Arts, Getman has
organized a series of programs which extend back to the child's infancy.

\begin{itemize}
\item \textsuperscript{85} Bryant J. Cratty, \textit{Developmental Sequences of Perceptual-Motor Tasks:}
\textit{Movement Activities for Neurologically Handicapped and Retarded Children
and Youth} (Freeport, L.I., N.Y.: Educational Activities, Inc., 1967),
preface.
\item \textsuperscript{86} \textit{Ibid.}
\item \textsuperscript{87} \textit{Ibid.}
\item \textsuperscript{88} Cratty, \textit{Perceptual-Motor Behavior and Educational Processes}, p. 16.
\item \textsuperscript{89} Getman, \textit{Developing Learning Readiness}, p. 7.
\end{itemize}
"It recreates the experience and movements which should have occurred, and provides an opportunity for the teacher to help the child integrate these factors into curiosity, information, understanding, and knowledge." It recreates, reinforces, and provides greater opportunities for him to develop physiologically so that he can perceive symbols, interpret them, and deal with them adequately. This program operates squarely upon the premise that the total child must interact in order to be ready to learn.90

This total child having acquired the Four Arts is deemed "ready" for academic pursuits.

The programs Getman considers to be adequate in order to arrive at this state are:

Practice in General Coordination
Practice in Balance
Practice in Eye-Hand Coordination
Practice in Eye Movement
Practice in Form Recognition
Practice in Visual Memory

Activities in these areas are presented in Dr. Getman's Developing Learning Readiness, A Visual-Motor-Tactile Skills Program.91

Other numerous programs have been developed for remediation of problems in learning based on the combined theories presented in the foregoing section.

It is not feasible to include all of these total programs in this report, but a brief resume of some of the most widely used ones is appropriate.

Frostig notes that "without good motor coordination, a child is handicapped not only on the playground but may also be retarded in all his learning."92 The remedial program which she has developed includes train-

90Ibid., p. 2.

91Ibid.

ing in each of five areas of visual perception, training for gross and fine muscle coordination, eye movement training, and activities for enhancing body image and body concept.

The Frostig "Developmental Test of Visual Perception" and the remedial tasks based on this diagnostic instrument are aimed at the improvement of visual-perceptual skills.\(^93\)


Barsch is another well-known educator who has devoted three volumes to explaining his Perceptual-Motor Curriculum.\(^95\)

Two more authors to be considered in line with occurrence of learning problems, who do not have organized programs for remediation, but do make some cogent observations concerning the perceptual-motor development of the child, are Ayres and Piaget.

Dr. Jean Ayres, whose writings reflect her concern with the development of the body scheme as being a fundamental "must", recognizes five syndromes indicating perceptual-motor deficits.\(^96\)

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\(^93\)Frostig and Horne, loc. cit.


The first syndrome that she identifies is "apraxia." "This refers to any individual who is having difficulty in motor planning; the clumsy child; the child who can't figure out how to get something down on paper; the child who can't learn to use scissors."

She suggests that tactile perception has "failed to add to the development of the body scheme and thus the child has difficulty with motor activity."

The obvious conclusion is that experiences designed to improve tactile perception and thereby contribute to a more adequate body scheme are in order.

"The second syndrome is entitled 'deficit in perception of form and position in space'...Some of the research suggests that the tactile and kinesthetic experiences then enhance the development of visual perception."

Ayres' suggestion follows that "if it is true that we can learn to visually perceive form and position in space if our kinesthetic perception is enhanced, then if we can find a way to enhance kinesthetic perception we are going to have a powerful tool for development of visual perception."

The third set of symptoms are: "difficulty in learning right-left sides of the body;...tendency to avoid crossing the midline;...difficulty in using the two sides of the body in a motor activity which requires a cooperative arrangement between the two sides of the body."

This third syndrome requires "a kind of gross motor activity that will enable us to learn to motor plan with our entire bodies... Some of these motor functions might very well be designed particularly to enhance the integrative motor function of the two sides of the body working for bilateral symmetrical activity as well as reciprocal activity."
The fourth syndrome is...deficit in visual figure-ground perception... It is closely associated with tactile perception... and the ability to motor plan."

Ayres asserts that the protective and discriminative tactile perceptions are monitored by the same "brain stem mechanism" as that which sifts out stimuli into foreground-background perceptions.

The fifth syndrome is characterized by the "hyperactive, distractible child" who has "inadequate tactile perception... whose protective system is predominating." 97

Ayres is presently developing a measuring instrument which would evaluate the amount of development or degree of deficiency in an individual's concept of his own body scheme. She considers the development of body scheme the basis of all learning and even more basic than motor learnings.

To this developmental hierarchy Piaget would assent, adding that no stage could be skipped.

Wolinsky in applying Piaget's theory of perception to instructional situations says:

It may well be that in helping our youngsters to meet the demands of their environment we have to take them back to the relatively undifferentiated period of the neonate and build with them the schema that they were not able to build themselves. 98

However, Ginsburg and Opper caution that Piaget's theory is somewhat "pessimistic." "Since intellectual development seems to follow an ordered

97 Ibid.  
98 Wolinsky, loc. cit., p. 23.
sequence...the young child is incapable of learning certain kinds of concepts."

Contrary to the prevailing trend "that it is possible to teach anything to a child of any level of development, providing the appropriate method is used, Piaget's findings tend to stress the contrary." This would not, however, preclude Wolinsky's suggestion quoted above, since the child in need of such remedial help would have superficially passed through each succeeding stage without acquiring the full growth components of that stage.

Empirical Data Supporting Causative Relationships between Perceptual-Motor Development and Achievement or I. Q.

Bryant Cratty's most recent publication, Perceptual-Motor Behavior and Educational Processes (1969), contains the most complete review of research available in the perceptual-motor area. It is not within the scope of this paper, however, to cite such broad and extensive research. The attempt herein is to choose studies which are directly concerned with intellectual functioning or academic achievement as related to perceptual-motor functioning.


100 Ibid., p. 226

101 Cratty, Perceptual-Motor Behavior and Educational Processes, loc. cit.
In the mind of most authorities in the education field who are concerned with perceptual-motor abilities "very few studies have been conducted on a longitudinal basis with an adequate number of subjects, and many of the other available studies have been questioned on the grounds of faulty research design."  

Rutherford's Doctoral Dissertation was a study "to determine what effects a perceptual-motor training program would have on the performance of kindergarten pupils on the Metropolitan Reading Readiness Tests." The experimental group made significantly (.01) greater gains than the control group. However, "the mean gain difference between boys of each group was much greater than it was between the girls of each group."  

"The mean gain difference between the two groups was highly significant (.001) in favor of the experimental group." Rutherford's conclusion was that, apparently, perceptual-motor training is an effective program for school readiness.

Fowler's study as reported by Valett concludes that sensory-motor training is valuable for total cognitive growth but that the period of training must be sufficiently long to have any effect.  

102 Valett, Programming Learning Disabilities, p. 100.  
104 Ibid., p. 64.  
105 Ibid., p. 63.  
Cratty reports a study by Oliver in which the conclusion was "that physical improvement positively affected mental functioning" but this was probably due to the improved self-concept of the children involved. Shotick and Thate presented findings which were very similar.

In a replication of Oliver's study Corder found that "the training group made significant gain in I.Q. scores over the control, but not over the officials group."

Three groups of eight educable boys each--the training group, the officials group, who scored the training group, and the control group--participated in the study for twenty days. The Hawthorne effect seems to be in evidence except that "there was no difference between the officials group and the control group." Perhaps the self-concept factor would again influence the gains of the training and officials groups.

Kephart and Kagerer found "that children with rigid posture were at the bottom of the class, while those with loose, comfortable posture were at the top. The differences lay in how well they had learned to use their bodies."


110 Ibid.

To bolster this improved achievement result Taylor, et al., found in their study that "as mobility and laterality improved reading also improved significantly."\(^{112}\)

As a result of a study by Carrick and Watson "a significant positive relationship between reading achievement and performance tasks of Neurological Organizations"\(^{113}\) was ascertained.

Delacato cites numerous other studies relating to reading achievement and neurological organization. All of these experiments have favorable conclusions.\(^{114}\)

However, Robbins' study contradicts Delacato's contention. In a well-controlled study of second graders divided into three groups--experimental, non-specific and control--Robbins concludes:

The data did not support the postulated relationship between neurological organization and reading. The data did not support the contention that the addition of the experimental program to the ongoing curriculum in any way enhanced the reading or lateral development of these children.\(^{115}\)

Cratty reports another study by Prangle and Solomon which concludes "intellectual functioning is largely independent of the motor domain."\(^{116}\)

J. McV. Hunt in his "Introduction" to The Montessori Method summarizes thus:

\(^{112}\)Raymond G. Taylor and S. Van L. Nolde, "Correlative Study Between Reading Laterality, Mobility, and Binocularity." Exception Children, April 1969, pp. 627-631.

\(^{113}\)Delacato, loc. cit., p. 64.

\(^{114}\)Ibid.


Recent evidence appears to indicate that the role of the eyes and the ears and perhaps the tactile organs, may be much more important in the organism's on-going informational interaction with the environment than are the motor outlets.\textsuperscript{117}

The same author cites a study by Denis and Denis,\textsuperscript{118} which agrees with the foregoing statement.

Denis and Denis in their study of Hopi children raised on cradle-boards found that the age of onset of walking did not differ from that of other Hopi children who had free use of their limbs.\textsuperscript{119}

The conclusion was that even with restricted movement the eyes and ears of those reared on cradle-boards were active and alert. The determining factors of early development and of achieving optimal level seem to be the variety of circumstances to which the child has access, not the opportunities for movement.

It is more important that the child have a clear image of what he is attempting than that he have the opportunity for muscle education.

\textbf{Conclusion}

As a result of the foregoing discussions on theories of perceptual-motor development, the opportunities for breakdown, lags or gaps in the sequence, the hypothesizing of experts for remediation, and the available empirical data, it becomes evident that no clear-cut tenets can be deduced as a mandate for perceptual-motor training of pre-school handicapped children.


\textsuperscript{118} Ibid., citing W. Denis and Marsena Denis, "The Effect of Cradling Practice Upon the Onset of Walking in Hopi Children", \textit{Journal of Genetic Psychology}, Vol. LVI, pp. 77-86.

\textsuperscript{119} Ibid.
Nevertheless, the efficacy of such training should not be overlooked. The lack of experimental data in no way discredits the very real and substantial progress which an individual may make as a result, direct or indirect, of perceptual-motor training.

In the final analysis it is the opinion of this author that perceptual-motor training for handicapped pre-schoolers is a desirable program from which children can derive numerous benefits.

To assert that such a program of training is the answer to the handicapped child's problem is an untenable position. However, no ill effects of such programming are discernable in the literature.

Therefore, the addition of such a program to the ongoing curriculum can be deemed reasonable and most likely profitable.
Summary

The area of perceptual-motor level and training continues to intrigue educators by its possibilities and uncertainties. The historical heritage of physiological education was briefly alluded to in order to set the stage for the recent revival of interest in this area.

Within this survey terms were defined, exposing the confusion and semantical problems which arise in arriving at precise and acceptable definitions.

Only an estimate of the number of children who have learning problems was offered since diagnostic standards are not available for statistical analysis. Developmental theories of the perceptual-motor sequence with probable explanations of problem-learners as viewed by authorities in the field was presented. Instruments for assessing the breakdown of the developmental sequence together with suggestions for remedial programs were included.

Research in perceptual-motor development and its causative relationship to inadequate intellectual and/or academic functioning was cited with no certain conclusions evident.

The process of normal growth development is definitely related to adequate intellectual performance since both are part of the total organism. However, much more time, effort and experience will be required to isolate the important factors which constitute the adequate person and enable one to function at optimal level.
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