AN EXPERIMENTAL ART CURRICULUM FOR THE REMEDIATION OF VISUAL PROCESSING IMPAIRMENTS AFFECTING READING

by

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CHAPTER I

INTRODUCTION

A complex body of literature has been accumulated over the past century dealing with the problems of visual perception. Much of the research has focused on the nature of visual processes in learning. Studies have ranged from analysis of the components of stimulus sensation to examination of deficits in visual perception and their remediation. Perhaps the greatest energy has been spent constructing models of the visual system which then serve as a basis for packaged programs designed to strengthen or prevent weaknesses in the perceptual processes.

The most well-documented area of visual perceptual study is reading, perhaps because it demands so much more of the eyes and brain than other human activities, or perhaps because it is one of the more essential human activities in Western society. Deficits in reading are not limited to visual processing impairments, of course, but there is sufficient evidence that reading problems a perceptual problems are strongly related to justify the bulk of literature on the subject. Few researchers have concerned themselves with visual acuity problems, but rather have concentrated on the central processing aspects of vision. Central processing deficits refer to problems centered in the brain which affect the utilization of perceptual information or the behavioral

responses to perceptual stimuli. They range from inabilities in constructing visual images to memory failure (Chalfant and Scheffelin, 1969). There is still some debate over the nature of central processing impairments with regard to whether they are symptomatic of brain injury, lack of experience, or maturational lag. For the educator, the etiology is relatively unimportant since his task is to deal with the behavior of the child.

Most researchers and theorists have concluded that although visual perceptual impairments manifest themselves in a multitude of distinct problematic reading behaviors, the underlying structure of the visual process is a system of complex relationships among the retina, eye muscles, electrical impulses, brain responses, past experience and expectancy (Haber and Hershenson, 1973). A major school of thought in both reading and visual processing asserts that the individual contributes as much or more to perception than the eyes or stimulus by bringing meaning to his percepts on the basis of an inherent inner organization based on previously processed visual information. The human organism appears to deal primarily with the task of gaining the most meaning from minimal cues in order to function more efficiently in the environment (Gombrich, 1965; Gregory, 1970; Haber and Hershenson, 1973).

Unfortunately, nearly all the tactics for diagnosis and remediation of visual perceptual deficits deal with isolated skills which have little to do with the integrated processes of sensing and giving meaning to visual information. Tasks are contrived on the basis of adult theories about children's inner processes without taking into account

the interests, motivation, or meaningful spontaneous activities of children. Thus, Frostig (1972) has dealt with children's discrimination of schematically-drawn flowers pointing in different directions. Kephart (1971) required children to walk a straight line across the floor. Cruickshank (1967) planned sequences of matching shapes, tracing forms, or copying geometric designs. Cratty (1967) believed that catching and throwing balls would help children with perceptual problems. The strictly academic therapist (and perhaps the classroom teacher as well) would have the child practice his "b's" and "d's" through a variety of matching games, workbook exercises, tactile equipment, and the like.

All of this has been an oversimplified account of some quite complex theories and methods of dealing with children deficient in basic perceptual processes. None of these approaches, however, considers the natural interests and inner processes universal to children before adults interfere with them. Children are seldom excited about doing dead-end drills. It is the writer's contention that remediation of visual processing deficits should begin with an area of basic interest to the child. One of these areas is art. Art is not only a universally occuring process in children between the ages of about three and twelve, but it incorporates those very elements of "seeing" that are essential to reading.

For the child who has experienced much failure in his academic career, art provides a guarantee of success since there are seldom rights and wrongs in two-dimensional self-expression. Obviously, the impaired child may not be "good" in art; he may even be aware that

what he draws doesn't look at all like the real thing. Yet he can have positive experiences by learning to see and represent the formal, linear, textural, and color qualities of the visual world.

It is no harder to believe that a child can become proficient in the visual skills necessary for reading through art, which has its basis in perception of the visual world, than to believe that he will read more effectively after practicing on the balance beam or on a geometric worksheet. Following the reasoning of Smith (1971) and Gregory (1970), it is possible that the artistic process, like reading and visual perception itself, has a deeply rooted inner structure which gives meaning to the visual world. This has important implications for the design and rationale of remedial programs for children with visual perception impairments. If the deficits center in visual skills, then isolated exercises may serve a purpose; but if the problems lie in information processing, remediation should deal with the total process of visual perception.

At this point, a direct quotation from Behrens (1969, p. 12) will serve to summarize and clarify the basis of this study.

> When we speak of perception, we usually mean those physical and mental processes through which we come to know "what is." Using this knowledge, we can learn to interact with other people, and with the objects and events of our environment. We can also say that if input is relevant to output, then as our ability to perceive is improved, so might our ability to interact be improved.

Purpose

The purpose of this study is to investigate the following questions in terms of the common perceptual elements in art and reading:

1. Are there any differences in the human figure drawings of second-grade boys with visual perceptual impairment and drawings of non-impaired peers?

2. If there are significant differences in the drawings of impaired versus non-impaired boys, what are the characteristic features which distinguish the art of the two groups?

3. How do the distinctive elements in the drawings of the impaired boys related to their reading deficits?

4. What effects will an art program based on the visual processes common to both drawing and reading have on the drawing, reading, and geometric design copying abilities of the impaired boys?

Theoretical Framework

In the educational and scientific professions, there are conflicting opinions about the nature of the perceptual process. Many changes have occurred recently in the theoretical visual models which guide research and education, the most significant of which are (1) the interpretation of perception as an active, not passive, involvement of the individual, and (2) the inclusion of the cognitive processing of stimuli as an integral part of the perceptual process. Foremost in its implications for remedial education is the idea that the human organism contributes vital experiential information to the visual

process, information which influences what the eye and brain search for, focus on, accept or reject, and interpret.

It is possible that the child with visual processing problems lacks the ability to direct his eye to that which is relevant to his purposes. Selectivity in the visual process begins with a head or eye movement response in the direction of a visual stimulus. If the perceiver decides that those items in his direct line of vision do not fit his purposes, he shifts his focus to something in his peripheral vision. There has been considerable investigation concerned with how the perceiver evaluates the visual information available in a given fixation, what criteria he uses to make the decision to continue or halt his visual search, and what influences his choice of items for the next fixation. Basically, the viewer's search process will be a function of what type of thing he is looking for. Is he after a specific stimulus, general kinds of unidentified things, or meaning? The child with visual perceptual impairment may not even know what he is looking for. If, in the past, he has not successfully categorized visual information, his problem is compounded when he is required to look for specific classes of things. Also, the foreknowledge which he has of the visual field and the particular items relevant to his search will influence the process of selectivity. "Search patterns are not random unless the observer has no information about the target" (Haber and Hershenson, 1973, p.217).

The implications for remediation are clear. The impaired child should know in advance what he is supposed to be discerning about a given visual field. Explicit verbal instructions concerning what to look for may be necessary, as well as help in classifying what he sees.

Humans tend to look at three general types of things: the useful, the interesting, and the sensually pleasing (Parmenter, 1968). A change in interest may, therefore, increase perceptual awareness of certain items in the visual field. Behrens (1969) and Gombrich (1959) both argue strongly that we see things as we know them to be, and focus on those aspects of the visual field relevant to our purposes. Parmenter (1968, p. 66) adds another dimension to the nature of visual selection in his statement, "The eye goes naturally to what it can comprehend most easily." Those who have explored the visual processes of impaired children have concluded that their eyes do not comprehend the written language with spontaneous ease. What then do these children grasp in the visual world? For most children, artistic expression is one of the developmentally earliest means of making sense of the external environment. The formal and design elements used in their art suggest something of those aspects of the world which have been comprehended. An investigation of the art forms of perceptually impaired children might reveal more precisely what their visual systems have and have not mastered.

Not all visual information is processed. In fact, irrelevant data must be ignored if the processing of important information is to occur efficiently (Haber and Hershenson, 1973). One of the most frequently noted disabilities of the perceptually impaired child is that of not using visual information effectively. He neglects that which is relevant and perseverates in his involvement with that which is irrelevant. Whereas the unimpaired perceiver discards visual cues which are not useful or interesting to him, the child with perceptual disabilities often has difficulty shifting his focus to more meaningful stimuli.

The well-integrated visual system also tends to ignore visual information which is confusing or hard to decipher, but the dysfunctioning system not only hangs on to meaningless visual cues, but finds more of the visual world confusing. Effective remediation would incorporate training in generalizations about what visual information is important and what is non-essential.

Certain characteristics of visual stimuli appear to influence the selection process in visual search. Color, orientation, and movement are useful clues in pursuing visual targets (Williams, 1969; Haber and Hershenson, 1973). If certain aspects of the visual field are familiar and distinct, they can be perceived without complete processing. "The true miracle, it seems to me, is not that we do not notice everything, but that we still store so many impressions that recognition of the familiar is guaranteed" (Gombrich, 1965, p. 18).

Thus, in the process of visual search, the viewer directs his eyes toward visual elements relevant to his purposes. He seeks those features which correspond to his foreknowledge of the target which he is seeking. When he lacks knowledge of the visual field, he focuses on things which are useful, interesting, or aesthetically pleasing, or those which are most familiar to him.

According to Gestalt principles, the human organism tends to perceive total forms rather than separate parts as a result of the nature of the relationships among the parts. The law of proximity, for example, suggests that spatial or temporal closeness makes disjoint elements appear as a unified group. The law of similarity states that visual entities are formed from items similar to one another. Directional

relationships provide for visual grouping under the law of good continuation. The law of common fate predicts that things which move or change concurrently will be seen as a group. The most familiar of the Gestalt laws is that of closure which states that the missing parts of an incomplete figure will be filled in during the visual process. Haber and Hershenson (1973) argued that these laws, although fairly accurate in their description of what happens in the visual process, seem to describe, rather than establish laws about, perceptual behavior. Little research has been done to determine whether the visual behavior of the perceptually impaired child accords with Gestalt principles. Bender (1938) has constructed a form copying test which aims to measure neurological immaturity in terms of certain Gestalt principles. In her work with the instrument, Bender has found that children with brain dysfunction reproduce notably immature forms, indicating problems with directionality and form integration.

There appears to be some relationship between the Gestalt visual principles and the inner structure of language proposed by linguists (Smith, 1971) in terms of an inherent tendency for humans to seek meaning and organization from their environment. This inner structure provides for the grasp of meaning despite grammatical or dialectic variations in language, and similarly in vision, allows for interpretation of the visual world in terms of generalizations which bridge the gap of unfamiliar stimuli or individual differences in interpretation. Where visual clues are ambiguous, the eye and brain use contextual information to clarify the meaning of the stimulus. As in language, meaning is grasped despite differences in the "visual language" of the

perceiver and the situational differences encountered across time. The child with visual processing impairments, however, may not be able to grasp the constancy of a particular visual cue in unique contexts. He may be unable to relate what he sees to past experience with similar percepts. What he needs, therefore, is help in maximizing his effective use of limited visual cues by relying on both the structure and the context of the stimuli. Such a program would have to involve the visual processs in a total way since few contextual cues for meaning can be gathered from isolated exercises in form completion or figure-ground discrimination. Art provides a means of looking at external stimuli with a definite purpose (representation of real world objects), while still maintaining the integrity of the visual world with its component parts, size and spatial relationships, formal and design qualities.

Kellogg (1967) described the function of art in the child as the means by which the irrelevant and scattered stimuli which bombard him daily are dealt with through the processes of selective attention, categorization, symbolization and external expression. Kephart (1971), in describing the sequence of perceptual-motor processes relevant to any learning, indicated that the processes which Kellogg linked to artistic expression form the basis of perception itself.

The artistic process involves more than just the reproduction of the visual world. It demands integration of perception and cognition as well as skill in manipulating media. "The formal features (of art) . . . are derived from the cognitive functions of the mind: the sensory perception of the outer world, the elaboration of experience in visual and intellectual thinking, and the conservation of experience and

thought in memory. Considered from this angle, pictorial work is a tool for the task of identifying, understanding, and defining things, investigating relationships, and creating order of increasing complexity" (Arnheim, 1964, p. 166). The basic perceptual skill required in drawing is the determination of relevant features and subsequently of a total visual pattern from separate perceptual components. A number of stimulus features must be differentiated in the visual process, including shape, color, spatial relationships, directionality, essential characteristics, class features, object relationships, and past-present relationships. Color appears to be one of the dominant cues in the visual process, but is seldom available in reading.

In the drawing process, a number of distinct steps occur which seem to be quite similar to those in reading. The object to be drawn (in reading, the word, phrase, or sentence) is analyzed in terms of its component parts. These are evaluated with regard to their relevance to the viewer's purpose; those which are essential are retained while the unimportant features are ignored. Spatial position of each component and inter-relationships in space are determined, as are relative proportions (in reading, this involves examination of the directions of letters, order of letters, and capital versus lower-case). The selected features are simplified into linear schemes, but it is still not clear how these are processed in children. Do children "abstract" the essential characteristics of the visual form? Do they simply perceive less than adults and draw exactly what they see? Or, do their eyes see as adults' do, but their minds impose simplifications upon the incoming visual stimuli? While the answer to this problem has important

ramifications in the total structure of perceptual models, as well as art theory, there is little to be gained by speculating on inner processes when the concern of the educator is with observable behavior.

Disorders in the drawing process, although only vaguely described in other research, appear to be closely related to reading difficulties which stem from visual perceptual disabilities. Goodenough (1926) summarized possible drawing disorders as deficits in analytic observation, visual imagery, eye-hand coordination, manual skill with the media, schematic relationships, portrayal of three-dimensional space, and Gestalt-type memory. The results of such deficits are often weak line quality, omission of details, fragmented forms, and distortion of basic geometric forms (Bender, 1952; Blanchard, 1952).

Kephart suggested that the impaired child is unable to pattern his motor responses, and thus deals with the environment in a haphazard way. Not only might his control of the art media be impaired, but his perceptual and motor involvement with external stimuli could be inefficient and unintegrated. As a result, the child's perceptual discriminations and inner organization remain fragments; it is possible that he is unable to form a complete image of things, let alone an externalized representation.

De Hirsch (1962, p. 219) defined reading as "the successful response to the visual forms of language." Behaviorally speaking, then, the common feature of all reading difficulties is the failure to respond adequately to the printed symbols of language. The causes and classifications of reading problems have been extensively researched but with disappointingly few consistent conclusions. A comprehensive overview

of the literature has revealed six basic areas of reading process impairment:

difficulty in selective visual search
inability to rehearse visual information subvocally
ineffective use of redundancy in language
inability to generalize to new contexts
difficulty integrating components into meaningful units
difficulty with short- and long-term memory

The behavioral manifestations of impairments in the visual search process range from the failure to respond to visual stimuli at all, to mere inefficiency in the selection of meaningful stimuli. The primary reading problem of young children seems to be failure to draw on relevant and essential cues in discriminating letters and words. Beginning readers often don't appreciate differences in direction, order, form and background, or detail, and thus confuse b with d, saw for was, and then for the. For many children, such problems appear to be developmental and are often "outgrown," but for children with minimal brain dysfunction, environmental deprivation, or severe maturational lag, such problems may remain stumbling blocks for a considerable length of time. Some children experience an additional difficulty in visual search demonstrated by a tendency to maintain inappropriate focus on irrelevant information. In such cases, reading is characterized by perseveration of sounds or inability to shift smoothly from word to word, or line to line.

Only very recently has the role of subvocal rehearsal in visual processing been confirmed as essential to the reading process (Davies, 1972; Wilson, 1971). Some children seem to lack the "inner ear" necessary to translate visual language into the more familiar verbal language. In order to maintain the meaning of what is being read,

especially in difficult or long passages, the reader must remind himself, or rehearse, what he has just read.

Children with reading problems frequently seem unable to grasp the patterns of redundant features in language. Such a deficit makes it difficult to predict what might come next in the text. Recent research has indicated that the guessing which is such an essential part of learning to read is haphazard and illogical among poor readers (Diack, 1960; De Hirsch, 1962). Thus, the contextual, grammatical, and structural cues which provide for fluent, meaningful reading among experienced readers are left unattended as the young reader struggles to decode each separate word, letter, and sound.

Related to, but not necessarily dependent upon, disabilities in the patterning of redundant features, is the frequently cited problem of integrating isolated components into meaningful language units (De Hirsch, 1973). A child may recognize and sound out d-o-g, but be unable to say the whole word, dog. He may see clearly the separate word units in a phrase or sentence, but have difficulty relating the words in a meaningful grammatical structure.

The place of memory in reading is not fully understood, even though "forgetting" on both short- and long-term bases is a common reading problem. The perceptually impaired child frequently has an inadequate memory for immediate visual information. Given a flash view of printed language, he has no idea whatsoever of the shape, form, components, or meaning of the stimulus. Other children, while capable of retaining visual stimuli, have difficulty relating them to stored images of the same or similar stimuli, and thus seem to forget words they just

knew. Closely related is the inability to transfer visual images to short- and long-term memory.

The child with visual processing deficits which exhibit themselves in reading needs training in several specific areas. Yet, if one adheres to an information-processing interpretation of reading, isolated exercises in visual search or memory are not conducive to improvement of the total reading process. In fact, studies have demonstrated that drill in certain perceptual skills results not in better reading, but merely better performance in those isolated skills which have been practiced (Robinson, 1972). A remedial program should incorporate training in the specific areas of each child's difficulty within the context of meaningful activity. Such training should include active, discriminatory visual search, rehearsal of visual information as it is processed, patterning of redundant features and utilization of this information for prediction of subsequent visual information, generalization of information to new situations, integrations of components into meaningful units, storage and retrieval of the processed data, and appropriate behavioral responses in terms of the demands of the visual field.

The drawing process in art appears to be a total-involvement, information processing activity. Art incorporates those elements of "seeing" essential to reading while providing for personal satisfaction and success. Beittel (1970) and McFee (in Eisner, 1972) discussed the meaning of information processing in art with the implication that a vital aspect of the drawing process involves efficient channeling of visual information into cognitive categories for the purpose of dealing

with the task of representation. Feldman (1970) went so far as to propose that the representational system which the child employs is not a set of abstractions but rather his best possible solution to the problem of drawing the visual world as he knows it. Artistic representation is not a duplication of the visual world, but rather an attempt to translate the structural qualities of its contents into another medium (Lansing, 1969).

If problem solving - that is, evaluation of, classification of, and response to stimuli - is a fundamental element of both drawing and reading, then a remedial program would do well to train the eye and mind to make discriminating decisions on the basis of the visual information available.

CHAPTER II

LITERATURE REVIEW

The literature reviewed covered the disciplines of visual perceptual processes, artistic processes, the perceptual element in reading, and principles of remediation. Theory and research were investigated for both normal and impaired performance of children in tasks of perception, art, and reading.

Visual Perceptual Processes

Despite the volumes of theory and experimental research on the mechanisms of perception, there remains disagreement regarding the issues of what is perceived, how the percept is given meaning, and what is remembered. Haber and Hershenson (1973) theorized that an individual perceives the discontinuities of light which are reflected from the object. Thus, contours and edges are important for accurate interpretation of the object perceived. Behrens (1969) thought that the similarities of the stimulus object to previously perceived stimuli provided the basis for perceptual meaning. Zusne (1970) tended to agree with this concept as he defined the process of gathering meaning through visual means in terms of five perceptual-cognitive tasks. Detection, he stated, was simply the process of determining if a given stimulus exists in the current visual field. Discrimination involved determining if the stimulus form is different from other forms. In the task of recognition, the question was whether the form has been perceived before.

Identification required naming the perceived form, and judgment was defined as the cognitive classification and synthesis of the perceived form.

Uncertainty remains, however, as to the specific factors influencing the tasks of determining if a particular stimulus is within the visual field, and discriminating its shared and unique qualities. Gombrich (1965) proposed that emotional involvement with a visual stimulus was conducive to retention of its image and further recognition of the stimulus within the visual field. Beyond the mechanics of head and eye movement essential to efficient visual scanning, Haber and Hershenson (1973) suggested that the selection of particular features was a function of the observer's purpose in looking and his foreknowledge of the characteristics of the object. Bruner's (1958) work with cognitive processes provided elaboration of the notion that perception was directed by the mind, rather than thought processes being subject to perceptual encounters. He postulated that since perception involved classification, it made heavy demands on the cognitive processes. The effective use of visual search to gain meaning from the world depended upon an efficient system of categorization (e.g., color, shape, spatial relationships, texture). Bruner, and more recently, Gregory (1970) discussed the function of redundancy in the environment as a facilitator in the development of cognitive categories. Thus, visual perception involves mechanical, emotional, and cognitive processes in attending to, selecting, and giving meaning to visual stimuli.

An additional aspect of visual processing is that of memory. Sperling (1969) provided a model of visual memory which included attend-

ing to the stimulus, scanning it for needed information, rehearsing that information subvocally, and finally, storing it in auditory memory. According to Mackworth (1972), more familiar stimuli would be remembered easier than less familiar ones. Within a series of items, contextual clues and the probability that one item would follow another aided visual memory. No conclusions have yet been offered regarding the exact nature of the memory, except that visual information like all other sensory information is stored in the brain as neural impulses (Haber and Hershenson, 1973).

Impairment, then, could occur within the visual-neural mechanisms of perception, the emotional condition of the observer, his cognitive ability to select and classify, or his ability to use contextual clues and redundancy in interpreting percepts. The literature indicated certain perceptual impairments were characteristic of both brain-injured and reading-impaired children. Paine, Werry and Quay (1971) found perceptual deficits and motor incoordination to be the most frequent symptoms of brain damage. Frostig (1972) observed that the majority of children seeking help in her clinic for reading problems also suffered from visual perceptual deficits. Although care must be taken in generalizing findings in the literature on brain-damaged children to poor readers or perceptually deficient children without apparent brain dysfunction, the common performance of the three groups on perceptual tasks is worth investigation. Cundick and Robison (1972) showed that brain-injured children could be distinguished from non-impaired children on the basis of the failure of the former group to accurately discriminate directionality, shape, and size in a design-matching task. Benton (1962) found

similar deficits (impaired perception of form, problems with visual-motor tasks, and confused directionality) in young children with reading problems.

Kephart (1971) characterized the child with minimal brain dysfunction as being unable to pattern information, In an earlier discussion (Kephart, 1960), he specified difficulties in form perception as an inability to recognize details and integrate them into a meaningful form. Difficulty in separating a visual figure from its background was also cited as an area of perceptual impairment. Wilson (1971) evaluated the performance of children with and without perceptual-motor handicaps, and found the handicapped group deficient in directionality skills. He suggested the problem might be due to weakness in verbal mediation, inadequate memory for relevant information, or difficulty grasping spatial differences.

The Artistic Process and Perception

Eisner (1972) defined four factors vital to artistic production: skill in handling the materials, skill in perceiving relationships among the real forms, development of mental images of the perceived objects, skill in inventing satisfying forms and arranging them within spatial and aesthetic order. There are numerous subskills within each of these broad abilities without which a child's artistic products fail to meet personal, social or age-level criteria. Feldman (1970) defined artistic representation as the evocation of a visual image which "fits" a set of visual stimuli. This viewpoint, akin to that of the Gestalt school, assumes that children's art reflects the actual visual image they have of a particular object. Yet it is apparent that children

know more about the world than their art shows. Arnheim (1969) supported the postulate that children know more about the visual world than their art indicates, but argued that representational realism would naturally be limited by perceptual immaturity and difficulty in translating the structural qualities of the object into two-dimensional media.

Lansing (1969, p. 71) provided an interesting definition of artistic perception as becoming "more discerning or more cognizant of the existence, character, or identity of things." Lowenfeld and Brittain (1970) observed that children who have had few perceptual experiences demonstrated an inability to notice variations among objects in their color, shape, form or texture. Lansing attributed to the art process the power to help children develop more perceptual sensitivity to the component qualities and overall configuration of visual objects.

Specifically, the process of drawing appears to require cognitive association between lines on paper and the object those lines represent, analysis of the object's parts, selection of those components essential to the object, analysis of spatial relationships and proportions, reduction of the components to linear forms, coordination of hand and eye, and adaptation of the drawing to the progressive development of the concept (Goodenough, 1926). A child whose human figure drawings are more immature than would be expected on the basis of his chronological or mental age could be experiencing difficulty in any combination of the above seven processes as well as emotional or motor development.

Kephart (1960) further emphasized the complexity of the act of drawing in his analysis of the child copying a square. Fundamental to

the successful reproduction of a geometric form are the following abilities:

Laterality: The child must find a beginning point with reference to his own body, and must conceptualize what type of movement he needs to begin.

Differentiation: The child must be able to move one arm without moving the other, and must sense the difference between hand and body movements.

Directionality: He must have kinesthetic awareness of horizontal, vertical, and depth dimensions as he draws.

Ability to stop: Using muscular and mental control, the child must stop his pencil movement at the corners of the square.

Ability to change direction: He must shift the direction of his pencil movement without losing shape or rhythm of the drawing.

Eye movements: He must control his eyes, see accurately, and relate what he sees to what he must tell his muscles to do.

Temporal-spatial translation: The child must simultaneously be aware of all aspects of the form, even though he can only draw these elements one at a time.

Form perception: He must perceive and represent linear contour, figure-ground distinctions, and parts of the form.

The inclusion of Kephart's explicit description of the processes required in drawing a simple form serves to illustrate the array of subskills with which a child might have difficulty, and also the complexity in designing perceptual training activities in art. Understanding of the nature of artistic development in young children is also fundamental to the preparation of a program of art. Harris (1963) reviewed a number of theoretical and empirical studies of children's

art, and made some conclusions worth noting here.

Scribbles are patterned by the structure of the hand, arm, and wrist and modified by the child's perception of his work.

Scribbles show circular character.

Scribbles may originate from inner motor patterning.

Scribbles show spatial orientation.

Drawing and writing show similar patterns of development.

Children show common patterns of directionality which are related to motor development.

Directionality shows developmental trends.

Orientation of the figure on the page is related to handedness in young children, but after learning to read, is related to left-right progression.

Motor factors control the drawing of very young children.

Cognition and speech development influence the drawing of schoolage children.

Children draw as they see things. All drawings are Gestalts but include more detail and differentiation with age.

Young children's drawings are influenced by concrete factors rather than the abstract.

Young children depend on tactile and kinesthetic cues more than visual; older children rely more on visual cues.

With age, children draw increasingly differentiated wholes.

Organization of drawing with many objects proceeds developmentally according to certain sequences.

Cognitive factors are crucial in the development of children's drawings.

Systematic changes occur when time lapses between viewing a model and the act of drawing.

Drawing from memory results in simplification, and sometimes amplification of the model.

Drawing from a model results in either simplification or amplification.

Language development is related to drawing performance.

Eisner (1972) also summarized more recent research in children's art and added several significant conclusions.

Children tend to exaggerate those aspects of a drawing which are most meaningful to them.

The young child's art is primarily pictographic (dealing with the bare essentials necessary for communicating), while the art of older children is more representational and aesthetically oriented.

Children of different cultures create mutually similar forms at comparable levels of development.

The human figure is the most common subject for preschoolers.

When drawing, children neglect to take visual cues from an available model, but develop the representation from the image in their mind's eye.

Drawing skills cease to develop during adolescence unless consciously cultivated.

Young children focus on forms rather than the total context of the figures.

It should be noted that many of Eisner's conclusions were based on the pioneering work of Rhoda Kellogg (1967, 1969) in the systematic investigation of children's art.

In summary, the artistic process makes heavy demands on all aspects of visual perception as well as perceptual-motor integrative processes, cognitive abilities, and emotional conditions. Deficits could occur in

innumerable areas, yet seem to cluster into certain patterns according to current research. Blanchard (1952) found that brain-injured youngsters characteristically omitted eye detail and had difficulty joining lines in their human figure drawings. Schildkrout, Shenker, and Sonnenblick (1972) characterized the drawings of minimally brain-damaged adolescents as immature, poorly integrated, with empty facial expressions, lack of details, missing parts, transparent or no clothes, flat heads, and little sex differentiation. Similarly, Reznikoff and Tomblen (1956) found the art of brain-injured adults to be poorly integrated, immature, and distorted. Michael-Smith's (1953) study of brain-damaged boys revealed only poor line quality as a differentiator of brain-damage versus non-impairment.

McAninch (1965) coordinated the literature concerning learning disorders with related deviations in artistic representation. A summary of her system is outlined below.

Impairment	Art Characteristics
Perception	
Figure-ground discrimination	Over- or underestimation of size, or incoherent size relationships
Like-unlike discrimination	
Discrimination of spatial relationships, part-whole, and inter-object relationships	Inclusion of irrelevant detail
Interpretation of stimuli	Confusion of figure and background
Constancy of form	Fragmented part-whole relationships
Cognition	
Relevant vs irrelevant focus on stimuli and property selection	Disjoint parts
Classification according to more than one property	Irrelevant combination of forms
Mental structuring of percepts	Non-meaningful verbal activity accompanying art activities
Mental restructuring of relationships	
Motor Performance	Jerky, heavy line quality

Goodenough (1926) cited Meumann, who in 1907, described drawing disorders in terms consistent with contemporary findings. He observed deficits in analytic observation, visual imagery, eye-hand coordination, relationship of forms, and portrayal of three-dimensional space. Arnheim (1964) commented that some children fail to visually connect the components of their drawings, apparently being satisfied with the mere temporal relationship of the items as they were drawn. Specific deficits in artistic performance appear to be related to perceptual, cognitive, and emotional processes, although no causal relationship has yet been established. Eisner (1972, p. 101) cited McFee who parallels the art process to reading by stating that the "ability to produce visual meaning is akin to the development of a visual code. The schemas form the letters and words of that code and their composition, its syntax or grammar."

The Reading Process and Perception

In spite of the theoretical similarities between the artistic and reading processes, certain fundamental differences exist which might limit the effectiveness of a remedial program based on anything other than reading itself. Elkind (1969) classified reading as a sign perception which required the ability to recognize that the letter symbols actually represent something. Art demands only the basic recognition of real objects at a parallel point in the information gathering process. In reading, a child must be able to perform certain cognitive operations such as simultaneously dealing with two or more properties, making serial relations, and generalizing from one context to another. While these processes are evident in artistic reproduction, a child

might easily compensate for deficits in higher level cognition by enriching his drawings with detail, color, or learned schemas.

Neurologically in reading, the child must be able to fixate on a word, pick up retinal clues about the stimulus object, retrieve and use stored information in order to discriminate word parts, associate the print with sound, integrate these associations into a word, and rehearse the word subvocally (Bryant, 1962). Footlik (1970) and Davies (1972) emphasized the vital role of inner language in mediating between the external stimuli and appropriate behavioral responses. Kephart's (1973, p. 326) statement that "language serves a vital function in the organization and utilization of perceptual information" suggests that reading and visual perception are complementary processes.

Diack (1960) outlined four principles of perceiving words relevant to a discussion of the poor reader who does not "see" words meaningfully. Stated as postulates, Diack's principles have implications both for diagnosis of possible reading impairments and development of remediation.

1. Words are not perceived immediately; too brief a presentation results in perception of a gray streak.

2. Details of a word are grasped sequentially over time, particularly if the word is unfamiliar.

3. Foreknowledge of the stimulus words aids in their total perception.

4. The whole word can be perceived if the reader is expecting to see it.

Mackworth (1972, p. 505) elaborated these last two principles by stating that "the development of hierarchal probabilities of relationships between words and even phrases is an essential part of reading." As in all visual processes, use of the redundancy naturally available in the

visual world facilitates the classification of stimuli and acquisition of meaning. Little research is available which investigates the inability to use contextual clues and redundant information as correlates of reading problems. De Hirsch (1962) came close to addressing this issue but even her description of common reading difficulties was limited to perceptual subskills. She observed that for some poor readers words never stood out on the page; the print remained a mess of unorganized detail. Children could not grasp the part-whole relationships which provided a basis for generalization. Some had difficulty using spatial and directional cues.

Jackson (1972) conducted a study on the initial responses of naive English-speaking subjects and children in New Guinea to the written English language. He found that reversals of "b" and "d" were common to both groups, despite the older chronological age of the New Guinea subjects. Jackson concluded that to children without prior experience with written language, letters and words are interpreted as the same on the basis of configuration, not directionality. A verification of this conclusion was provided by Kephart (1960) who observed that the basic problem of disabled readers was failure to evaluate word shapes and sounds, and formulate the sound-symbol relationship.

Frostig (1965) and Schwalb, Blau and Blau (1971) delineated specific subskill deficits characteristic of poor readers. These included an inability to recognize or recall written symbols, particularly in new contexts, reversal and rotation of letters and words, confusion of graphically or phonetically similar letters, difficulty keeping place on a page of print, and guessing on the basis of insufficient information.

Principles of Remediation

Oblivious to the fact that uncertainty remains regarding the exact nature and interaction of perceptual deficits related to reading and art, educators have managed to develop a circus of remedial philosophies and programs. Without repeating what has already been discussed in this paper concerning specific programs and their pitfalls, it would be helpful to discuss goals and principles presented by various researchers.

McAninch (1965) set eight goals for the remediation of body image problems related to perceptual disorders. The child should:

1. Develop form constancy.
2. Develop laterality and directionality.
3. Develop a concept of his own body size and its location in space.
4. Develop an awareness of the relationship between himself and the environment.
5. Develop understanding of his own spatial orientation.
6. Develop awareness of all body parts, their functions, potentials, and integrative relationships.
7. Develop hand-eye coordination.
8. Develop control and structure of his body movement and behavior.

The basic principle underlying McAninch's approach was that by strengthening the child's body image he will be able to have a more stable self-reference point from which to interact and gather information from the environment.

In a handbook for perceptual training, Cunningham and Reagan (1972) described similar objectives as McAninch, but focused on more specific perceptual-motor skills such as fine muscle coordination, tactile sense development, awareness of shapes, sizes, position of objects in space, prepositional relationships, and verbalization abilities.

Successful accomplishment of specific behavioral objectives is certainly a function of the effective application of valid teaching principles. Cratty (1967) indicated that children with perceptual handicaps may require a somewhat different learning situation than non-impaired children. Within a basic developmental sequence, the tasks should be novel and frequently modified. The child should be stimulated to think about his involvement with the task and make increasingly more independent decisions as he works. Practice should be spaced and skills overlearned. The child should understand exactly what he is responsible for learning, and should be shown relationships among the skills learned. Bryant (1965) agreed that perceptual and associational responses should be overlearned in order that the initial discrimination of stimuli not hinder comprehension and higher-level processing.

Although Frostig has developed a detailed program for remediation of visual perceptual deficits, she advocated three rather open-ended goals applicable to many types of remedial programs. These were proficiency in verbal labeling, development of perceptual inference skills, and understanding of the relationship between manipulative activities and symbolic language (Frostig, 1972).

Chalfant and Scheffelin (1972) integrated literature on central processing dysfunctions and concluded that there were four broad areas

in which the impaired child must gain proficiency through a remedial program. The first stage of proficiency involved learning to search for visual information systematically. Next, the child must learn to determine what visual information is relevant to his purposes. He must be taught how to use the information which he acquires, then formulate strategies for predicting subsequent stimuli on the basis of available information.

Gehres (1967) believed that art was one means of achieving goals in information processing training since it serves as an organizer of environmental experiences.

Rationale for Hypotheses

In summary, the literature reviewed in this paper suggests the need for a remedial program for visual perceptual impairments which is based on (1) those visual processes relevant to reading, (2) the natural interests and inner organization of children, and (3) the assurance of more successes than failures. Little has been done to demonstrate that the art of the perceptually impaired child is qualitatively different from the art of an unimpaired peer. There has been no descriptive analysis of the relationships between deficits in reading and art due to central processing dysfunctions, despite the fact that many researchers are free in their generalizations that the impaired child produces drawings distinctively different from the norm.

The process of drawing demands facility in some of the very processes inherent in reading: selectivity of essential stimulus qualities, disregard of extraneous information, discernment of components and their

relationships, integration of separate fixations into a complete image, recall of past experiences with similar stimuli, classification and meaningful interpretation of the stimuli, organization of inner resources for a behavioral response, and accurate external responses. Since art functions for the normal child as a means of sifting out irrelevant stimulus information while systematizing that which is meaningful, a well-structured art program should aid the child with visual-perceptual disorders in organizing his experiences and developing purposeful and efficient methods of dealing with the visual world.

In light of the research findings and unresolved questions in the area of visual processing impairment, the following hypotheses are posited in null and alternate form, where E represents the experimental group, A represents the average readers, and C represents the poor reader control group.

Hypothesis 1: The human figure drawings of second-grade boys with visual perceptual impairments exhibited in reading will not be significantly different from those of average reading peers in terms of Goodenough Draw-A-Man pre-test scores.

$$H_0: \mu_E = \mu_A$$

An alternate hypothesis is that the human figure drawings of second-grade boys with visual perceptual impairments exhibited in reading will be significantly different from those of average reading peers in terms of Goodenough Draw-A-Man pre-test scores.

$$H_A: \mu_E \neq \mu_A$$

Hypothesis 2: There will be no significant difference between the Goodenough Draw-A-Man adjusted post-test scores of the experimental

group as compared to the adjusted post-test scores of the poor reader control group.

$$H_0: \mu_E = \mu_C$$

An alternate hypothesis is that there will be a significant difference between the Goodenough Draw-A-Man adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the poor reader control group.

$$H_A: \mu_E \neq \mu_C$$

Hypothesis 3: There will be no significant difference between the Bender Gestalt adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the poor reader control group.

$$H_0: \mu_E = \mu_C$$

An alternate hypothesis is that there will be significant differences between the Bender Gestalt adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the poor reader control group.

$$H_A: \mu_E \neq \mu_C$$

Hypothesis 4: There will be no significant difference between the Metropolitan Achievement reading subtest adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the poor reader control group.

$$H_0: \mu_E = \mu_C$$

An alternate hypothesis is that there will be a significant difference between the Metropolitan Achievement reading subtest adjusted post-test

scores of the experimental group as compared to the adjusted post-test scores of the poor reader control group.

$$H_A: \mu_E \neq \mu_C$$

Hypothesis 5: There will be no significant difference between the Goodenough adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the average reader group.

$$H_0: \mu_E = \mu_A$$

An alternate hypothesis is that there will be significant differences between the Goodenough adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the average reader control group.

$$H_A: \mu_E \neq \mu_A$$

Hypothesis 6: There will be no significant difference between the Bender Gestalt adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the average reader control group.

$$H_0: \mu_E = \mu_A$$

An alternate hypothesis is that there will be a significant difference between the Bender Gestalt adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the average reader control group.

$$H_A: \mu_E \neq \mu_A$$

Hypothesis 7: There will be no significant difference between the Metropolitan Achievement reading subtest adjusted post-test scores of the experimental group as compared to the adjusted post-test scores

of the average reader control group.

$$H_0: \mu_E = \mu_A$$

An alternate hypothesis is that there will be a significant difference between the Metropolitan Achievement reading subtest adjusted post-test scores of the experimental group as compared to the average reader control group.

$$H_A: \mu_E \neq \mu_A$$

CHAPTER III

METHOD

Subjects

The subjects were fifty males drawn from the second-grade population of two Montgomery County, Virginia, public schools. Permission to work in these schools was obtained from Mrs. Charlotte Beamer, Elementary Education Supervisor, Mr. Gary McCoy, principal at Harding Avenue School, and Mr. Douglas Morgan, principal at Margaret Beeks School.

The study was limited to males in order to control for sex differences in maturation and art interest factors. Also, a larger sample size was expected with boys rather than girls since research indicates that up to ten times as many boys as girls experience reading difficulties, especially those related to visual perception (Senz, 1962; Coleman, 1968; Bender, 1972). Other studies (Halliwell and Solan, 1972) have shown that remedial programs in visual perception are more effective with boys than girls.

The subjects were initially assigned to two groups on the basis of teacher recommendations. The average reader control group (N = 26) consisted of boys described by their teachers as reading at or above their grade level, with no apparent visual processing deficits. The poor reader group (N = 24) was referred on the basis of a checklist of possible disorders in the visual aspects of reading (See Appendix A).

Parental permission was obtained for each referred boy. Permission was obtained for testing and, where applicable, for inclusion in the art curriculum, by sending home with each boy a written explanation of the program, a cover letter from each principal, and a detachable permission form (See Appendix B).

The experimental group consisted of boys in the poor reader group whose scores were one-half of one standard deviation below those of the average readers on three measures, the Bender Visual Motor Gestalt, the Goodenough Drawing Test, and the Metropolitan Achievement Test reading subtests. Scheduling difficulties limited the experimental group to eleven boys from Harding Avenue School whose test scores fell within the prescribed range. The remaining 13 subjects in the poor reader group served as controls to indicate the amount of change poor readers would show on the three measures over a five-week period without art training.

Instruments

The three assessment measures were selected on the basis of theoretical and empirical support for their involvement of visual processes related to reading, their availability, and the practicality of quick group administration in a public school setting.

The Goodenough Drawing Test (Goodenough, 1926) was designed to assess mental development on the basis of the degree of complexity and integration within a child's human figure drawing. Items for which credit is given in scoring include the presence of certain body parts, clothes, line quality, and addition of realistic detail. Research has demonstrated relationships between the Goodenough and measures of

intelligence, reading, and perceptual performance. Pikulski (1972) found a moderate but significant relationship between poor readers' performance on the WISC, Goodenough, and Goodenough-Harris revised drawing tests. The slightly higher correlation between the original Goodenough and WISC over the revised Goodenough-Harris and WISC suggested that the original drawing test is preferrable, especially since it requires less time for administration and scoring. Correlations between the WISC performance section and Goodenough ($r = .52$) were notably higher than between the WISC verbal score and Goodenough ($r = .20$), suggesting that the drawing test measures performance-type abilities rather than verbal ones.

Hartman (1972) found consistent intra-group performance on the WISC, Bender, and Goodenough-Harris by groups of children with visual-motor disabilities, or specific reading disabilities, or no learning problems. Thus, it appears that there is a performance element in mental maturity which the human figure drawing test taps, and which is related to reading performance.

Goldberg and Drash (1968) suggested that both the Bender and the Draw-A-Man tests were effective as parts of a battery for diagnosing reading disorders which stemmed from difficulties in visual processing. De Hirsch and Jansky (1966) conducted extensive research on intruments which could predict reading failure, and found that human figure drawing correlated weakly, but significantly with reading performance, and the Bender correlated highly with later reading achievement.

Bender (1970), in discussing her test of visual-motor performance, suggested that most reading problems stemmed from a maturational lag

which would be reflected in immature geometric form copying. She described the sequential developmental processes required for adequate performance on the test as first, control of circular movement, then figure-ground discrimination and organization of the components into a pattern, horizontal, then vertical and diagonal orientation, and differentiation of the parts in a figure. A disorder in any of these processes could result in distortion of the reproduced forms, including erroneous orientation of the figure, rotation, flattened angles and curves, failure to make diagonal relationships, and verticalization of horizontals.

Koppitz (1964), who developed a standardized Bender scoring system for young children, observed several relationships between the processes required by the Bender and by reading, including perception of patterns, spatial relationships, and organization of the stimuli. Attention to detail such as angles, dots and rows, and accurate perception of the direction of a figure also seemed important to reading skills. After a review of literature on the Bender and reading, Koppitz concluded that children with poor reading skills and poor Bender scores probably have visual perceptual deficits. It should be noted that in scoring the Bender, negative points are given for the presence of certain distortions; thus a high score is suggestive of visual-motor difficulties, and correlational studies with other measures will show a negative correlation.

Conner (1969), Jansky and De Hirsch (1972), Keogh (1965), and Keogh and Smith (1967) found extreme Bender scores to be accurate predictors of later reading achievement. Specific items on the Bender

did not effectively discriminate between poor and average readers, although the total scores did. Koppitz (1964) found common factors between performance on the Bender and reading readiness to be perception of direction and the shape of forms. She also found a significant correlation between the Bender and the Metropolitan Achievement Test, and concluded that the research with these two instruments indicates that similar factors are being assessed.

Procedure

All boys for whom permission was granted were administered the Bender Visual Motor Gestalt and Goodenough Drawing Tests over a three-day period in October, 1974. The test groups consisted of eight to ten boys with random inclusion of both average and poor readers in each group. The Bender was administered using large (18" x 23") white poster-board cards into which the original designs had been copied in black ink with the aid of drafting equipment. The findings of Smith and Keogh (1962) that there were no differences in performance scores when the test was administered in a group instead of individually gave support for small group administration. Verbal instructions to the children and scoring procedures were used in accordance with Koppitz's (1964) recommendations.

The original Goodenough (1926) manual of instructions and scoring guided the administration of the Draw-A-Man test. Intelligence quotients were not computed since no other mental measures were available for comparison. Raw scores were compared in terms of age and grade norms.

The researcher scored the pre- and post-test Bender and Goodenough protocols, and the post-test Metropolitans. (Pre-tests on the latter

measure were scored by the classroom teachers as part of routine end-of-first-grade assessment.) In order to guard against bias on the Goodenough resulting from fatigue or the effects of increased experience with the measure, one-fourth of the protocols were randomly selected for re-scoring. Differences between the first and second mean scores were negligible for both the poor reader and average reader groups (See Table I).

Reading scores were obtained from the Word Knowledge, Sentences and Stories subtests of the Metropolitan Achievement Test, Form G, administered to all children in Montogomery County at the end of first grade. Thus, scores for these subjects had been obtained in May, 1974. Subjects who were not in the school system at that time did not have Metropolitan scores available. These boys (N = 7) were excluded from analysis of pre-test reading performance data.

Following administration of the pre-tests, the experimental group participated in a five-week art program (fifteen half-hour sessions) designed to facilitate development of those perceptual processes common to both art and reading. See Appendix C for a detailed description of the art curriculum.

Post-tests were administered in mid-December, following the same procedure as for pre-testing, except that three subtests of the Metropolitan Achievement Test (Word Knowledge, Sentences, and Stories) were also administered. All subjects in all groups were tested.

TABLE I

Differences Between First and Second Scorings of Goodenough Drawing Pre-Test

Group	# Scores	Mean Initial Score	Mean Second Score	Difference
Total Poor Readers	6	14.83	14.83	0
Average Readers	6	19.17	18.67	.50

CHAPTER IV

RESULTS AND DISCUSSION

Results

To ascertain whether differences existed between the total poor reader and average reader groups, t-scores were computed to compare the differences between the mean performances of each group on the Bender, Draw-A-Man, and Metropolitan Achievement reading subtests. Results indicated that significant differences did exist between the average and poor reader groups on all three measures (See Table II.)

Cross-tabulations were computed to determine pre-test differences between the average and poor reader groups on the Bender and Draw-A-Man tests. The poor reader group scored significantly lower on the items listed in Table III.)

In order to assess the effects of the art curriculum on the performance of the experimental group on all three measures, multivariate analysis of covariance was used. Adjustments were made in the post-test scores by covarying chronological age, pre-test Bender scores, and pre-test Goodenough scores. The covariants, post-test scores, and adjusted post-test scores are found in Table IV.

Results from the MANOVA indicated that there was a significant difference among the three groups on the linear combination of the variables ($F = 9.79$, $p < .001$). Following the MANOVA, single degree of freedom multivariate linear contrasts were computed to determine whether

TABLE II

T-Test for Average and Poor Reader Groups

Measure	t-Score	Level of Significance
Bender	4.62	$p < .001$
Goodenough	2.60	$p < .02$
Metropolitan	6.41	$p < .001$

TABLE III

Cross-tabulation for Bender and Goodenough Tests

Measure		Items	Level of Significance
Bender			
	1a	Distortion of Shape	$p < .05$
	1b	Disproportion	$p < .05$
	2	Rotation	$p < .10$
	3	Integration	$p < .10$
	8	Integration	$p < .05$
	13	Rotation	$p < .001$
	14	Integration	$p < .10$
	18a	Distortion of Shape	$p < .01$
	21b	Distortion of Shape	$p < .05$
	23	Integration	$p < .01$
	24	Distortion of Shape	$p < .05$
Goodenough			
	5b	Correct attachment of arms and legs	$p < .01$
	7c	Mouth present	$p < .05$
	9a	Clothing present	$p < .05$
	9b	Two articles of clothes non-transparent	$p < .05$
	11b	Leg joint shown	$p < .05$
	12e	Arms and legs in two dimensions	$p < .10$
	14a	Motor coordination: line quality	$p < .001$

TABLE IV

Summary of Pre- and Post-Test Data

Measure	Group	# Scores	Pre-Test Mean Scores	Post-Test Mean Scores	Gain Scores	Post-Test Adjusted Means
Bender	Average Reader	26	-4.08	-4.15	-0.07	-5.33
	Poor Reader Control	13	-6.38	-5.31	+1.07	-4.77
	Experimental	11	-9.20	-7.27	+1.93	-5.13
Goodenough	Average Reader	26	19.66	22.77	+3.11	21.08
	Poor Reader Control	13	17.62	18.01	+0.39	18.55
	Experimental	11	13.64	18.82	+5.18	22.26
Metropolitan	Average Reader	26	69.50	73.69	+4.19	71.72
	Poor Reader Control	9	39.00	47.46	+8.46	47.43
	Experimental	9	35.89	45.18	+9.29	49.86
Chronological Age	Average Reader	26	7-5			
	Poor Reader Control	13	7-10			
	Experimental	11	7-4			

the experimental group was significantly different from either the average reader group or the poor reader control group (Table V). The data indicated that there was a statistically significant difference between the adjusted linear combination of post-test measures of the average reader and experimental groups, with the average group having the higher value. There was not a statistically significant difference between the experimental and poor reader control groups.

Subsequently, simultaneous confidence intervals were computed to determine which of the adjusted post-test measures contributed significantly to the previously mentioned difference between the experimental and average reader groups (Table VI). The data indicated that this difference was due primarily to the higher adjusted post-test reading score of the average reader group as compared to that of the experimental group.

In summary, analysis of the data led the researcher to reject the following null hypotheses:

Hypothesis 1: The human figure drawings of second-grade boys with visual perceptual impairments exhibited in reading will not be significantly different from those of average reading peers in terms of Goodenough Draw-A-Man pre-test scores. T-scores computed on the drawing pre-tests revealed that the human figure drawings of the poor readers differed significantly from those of the average readers, with the poor readers having the lower scores.

Hypothesis 7: There will be no significant difference between the Metropolitan Achievement reading subtest adjusted post-test scores of the experimental group as compared to the adjusted post-test

TABLE V

Single Degree of Freedom Linear Contrast for Differences

Differences	Test Statistic	Level of Significance
Experimental vs Average	U = .406	$p < .05$
Experimental vs Poor Reader Control	U = .887	$p > .05$

TABLE VI

Simultaneous Confidence Intervals for Adjusted Means

Measures	Groups	Adjusted Means	Group Differences	Intervals
Metropolitan	Experimental	49.87		
	Poor Reader Control	47.43	Experimental vs Average	(-7.34,-36.36)*
	Average Reader	71.72	Experimental vs Poor Reader	(18.96,-14.10)
Bender	Experimental	-5.13		
	Poor Reader Control	-4.76	Experimental vs Average	(2.79,-3.18)
	Average Reader	-5.33	Experimental vs Poor Reader	(3.77,-3.03)
Goodenough	Experimental	22.26		
	Poor Reader Control	18.55	Experimental vs Average	(8.24,-5.97)
	Average Reader	21.08	Experimental vs Poor Reader	(11.75,-4.32)

* $p < .05$

scores of the average reader control group. Analysis of the data demonstrated that the average readers scored significantly higher on the Metropolitan Achievement reading post-test than did the experimental group.

The researcher failed to reject the following null hypotheses:

Hypothesis 2: There will be no significant difference between the Goodenough Draw-A-Man adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the poor reader control group. The data showed a numerical, but statistically non-significant difference between the experimental and poor reader control groups on the drawing test.

Hypothesis 3: There will be no significant difference between the Bender Gestalt adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the poor reader control group. The adjusted post-test scores of the two groups were not significantly different on this measure of perceptual-motor ability.

Hypothesis 4: There will be no significant difference between the Metropolitan Achievement reading subtest adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the poor reader control group. The data showed that both groups performed about the same on the reading post-test.

Hypothesis 5: There will be no significant difference between the Goodenough adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the average reader group. Analysis of the post-test scores showed that the experimental group scored numerically, but not significantly, higher than the average

reader control group on the drawing test.

Hypothesis 6: There will be no significant difference between the Bender Gestalt adjusted post-test scores of the experimental group as compared to the adjusted post-test scores of the average reader group. The data revealed no significant difference between the average and experimental groups on the Bender post-test scores.

Discussion

The significant difference between the scores of the average and poor readers on the pre-test measures suggests that the two groups differed in their perceptual-motor, reading, and human figure drawing abilities. This finding is consistent with the theoretical and experimental literature correlating art and reading in terms of mutual underlying processes in visual perception (Robinson, 1958). It would be risky to conclude that the poor reader with immature drawings suffers from visual processing dysfunctions, due to the numerous uncontrollable factors which influence the development of art and reading skills. It is not quite so speculative, however, to suggest that the child with diagnosed visual perceptual deficits is likely to have difficulty with reading and human figure drawings.

The specific items on the Bender and Goodenough which differentiated the poor and average readers must be interpreted with caution since neither test was designed for an item-by-item analysis. General trends of performance on the Bender indicated that the poor readers had difficulty with integration of adjacent or overlapping forms and accurate reproduction of complex, angular shapes. Koppitz (1958) found seven categories of performance on the Bender which differentiated poor and good students:

distortion of shape, rotation, substitution of circles and dashes for dots, perserveration, failure to integrate parts into wholes, more than three angles in a sinusoidal curve, and extra or missing angles on hexagons. Koppitz used these items as the basis for her scoring system of the Bender.

The items failed by the poor readers on the drawing test were characteristic of those missed by younger children. In other words, the drawings were immature, but none so severely distorted as would be characteristic of brain-damaged children. This immature quality in human figure drawings combined with integrative and angular form difficulties on the Bender supports the work of Bender (1938) and Ames and Ilg (1965) who have hypothesized that most poor readers are simply not developmentally ready to read. A second-grader is not necessarily on the second-grade level in all areas of development. Another interpretation of this apparent developmental unreadiness seen in the art and design copying of the poor readers may rest in the notion of an isolated central processing dysfunction. Chalfant and Scheffelin (1972) indicated that a very slight disorder in a single neurological function could create difficulties in information processing. Without neurological assessment, however, it is impossible to determine if the immature responses of the poor readers were related to brain dysfunction, or some other difficulty such as developmental lag or environmental deprivation. The post-test improvement of both the experimental and poor reader control groups on the Bender and Goodenough suggests that the poor readers all experienced the benefits of either developmental or classroom learning factors on their perceptual-motor abilities. The

improvements of these abilities apparently did not have much influence on the reading abilities of the poor readers, suggesting the possibility of specific reading disabilities, rather than central processing dysfunction, as the source of difficulty for these children.

In addition to the quantified differences on the Draw-A-Man test, the poor reader group demonstrated several qualitative responses such as frequent erasures and lack of fine motor control in joining parts. It is especially interesting to compare the drawings of the experimental group over time. Scored according to the Goodenough system, the mean pre-test score was +13.63. The raw post-test score was +18.82, and adjusted for the covariants of age, pre-test Bender, and pre-test Goodenough scores, was +22.26. This adjusted post-test drawing score was above the score of the average readers on the same measure, as was the mean score on an "assisted drawing" assignment given during the art curriculum (+23.25). It should be recalled that the technique of assisted drawing involves verbalizing for the child the parts and relationships within the model. In the case of the assignment under discussion, the model was the researcher (a situation which appeared to be highly motivating to the subjects). The implication of the high score on the assisted drawing task, supported by the unassisted performance of the experimental group on the drawing post-test, is that the boys had no inherent dysfunction of perception or cognition. They were able to receive visual and auditory stimuli simultaneously, attend to detail within the context of a total form, and integrate the components into unique wholes. When the visual information was selected and verbally rehearsed for them through the technique of assisted drawing,

the subjects were able to produce fine drawings on the level standard for boys their age.

Although the experimental group's adjusted post-test score on the Draw-A-Man was not significantly higher than the scores of the average or poor reader groups, it was numerically higher. There was a significant increase in the pre-post test drawing scores for the experimental group ($t = 5.56$, $p < .001$). The data suggests, then, that the art curriculum had positive effects on the draw-a-man abilities of the experimental group. Considering the short duration of the art program, this improvement may be regarded as an important finding, since art is a developmental process based on certain underlying processes relevant to reading and perception. Although there was no apparent transfer to reading or visual perceptual performance, the theoretical relationship among the three abilities lends credence to the possibility that the art program may have produced improvements in reading and visual perception had it been extended over a longer period of time and provisions made for transfer of artistic abilities to other areas.

It is worth noting, however, that both the experimental and poor reader groups performed within the average range on the post-Bender and Goodenough tests. Subjects in the poor reader control group experienced an increase in their design copying and drawing scores independent of any specific intervention. This suggests the involvement of either maturational or classroom learning factors in facilitating the progress of disabled readers. Whatever the underlying causes for their improved performance on perceptual and drawing measures, the subjects in both the experimental and poor reader control groups remained below grade level

readers. The only significant difference among groups uncovered by statistical analysis was the ability on the basis of which subjects were initially assigned to groups, namely, reading. The experimental and poor reader groups improved somewhat over their pre-test scores on the reading measure, but the average group scored significantly higher.

Although the data implies that the art curriculum was ineffective in improving reading and visual perception, the theoretical support for a remedial program of this nature should not be discarded. The limitations of art as a remediator of reading disabilities appear to be related primarily to difficulties in transfer of skills across disciplines. It is conceivable that a high-interest area such as art might be integrated with a reading program in order to make the remedial process less painful. Further research in the relationship of artistic processes to reading and perception is necessary before an effective remedial program based on art can be designed. See Appendix D for a preliminary system of hypothetical relationships among art, reading and perception, based on the literature reviewed and findings in this study.

The experimenter observed several limitations to her current study which hindered the effectiveness of the art curriculum. The failure to integrate art and reading activites was to the disadvantage of the program as it violated principles of transfer learning. Small sample size and inadequate time span were additional limitations which might have been overcome had a more adequate research design been possible. By obtaining subjects through the public school system, however, the researcher had to sacrifice optimal research design for ethical and practical

considerations. Perhaps the most devastating drawback was the failure of the experimenter to thoroughly integrate the available theoretical and empirical information in the construction of the curriculum.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purposes of this study were to investigate the drawing qualities which differentiated poor and average readers, and to measure the effects of an art curriculum on the reading, drawing and design copying abilities of perceptually impaired poor readers. Twenty-six second-grade boys comprised the average reader group, and twenty-four boys were in the total poor reader group, out of which were selected eleven with visual perceptual difficulties to form the experimental group. The Bender Visual Motor Gestalt Test was used to assess visual-motor abilities. The Goodenough Drawing Test served as the measure of human figure drawing abilities. Reading levels were evaluated with the Metropolitan Achievement Test reading sections.

Mean pre-test scores showed that the poor readers scored significantly lower on all three measures than the average readers. Analysis of performance on individual items on the Bender and Goodenough revealed several trends which distinguished the poor readers from the average readers.

After administration of the art curriculum (fifteen half hour sessions) to the experimental group, post-tests were given to all groups to determine the effects of the art program on reading, drawing, and perceptual skills. Statistical analysis of the data indicated that the post-test mean of the average reader group on the reading measure was

significantly higher than the reading score for either the experimental or poor reader control groups. There was no significant difference among groups on the Bender Gestalt or the Draw-A-Man, although the adjusted post-test mean on the drawing test was noticeably higher for the experimental group than for the poor reader or average reader control groups on the same measure.

Conclusions

The pre-test differences between the average and poor readers on the drawing test lend support to the theory that poor readers do not process visual information as efficiently as do average readers. The item-by-item analysis of common errors of the poor readers on the Goodenough and Bender tests revealed general immaturity in form copying and human figure drawing. The improvement of both the experimental and poor reader control groups on the Bender and Goodenough post-tests provided support for the idea that there was no specific central processing dysfunction among any of the poor readers, but rather some sort of maturational factor at the root of their problems in reading, perception, and drawing.

The improved performance of the experimental group on the drawing test produced an adjusted mean post-test score higher than that of either control group, suggesting that the art program had positive effects on the human figure drawing abilities of the experimental subjects. The experimental group's scores on the Bender and Metropolitan Achievement reading section were below those of the average readers and on par with those of the poor reader control group, suggesting

little transfer of art improvements to other skill areas. The implication seems to be that improvements in drawing abilities were a function of specific training rather than changes in underlying structures relevant to reading, art, and visual perception.

Recommendations

Should the study be replicated or expanded, certain changes might contribute to the efficacy of the art program.

1. The sample size of the experimental group should be increased to at least twenty-five in order to provide a tighter experimental design.

2. The experimental design should allow for random selection of the experimental group from a larger group of poor readers with visual perceptual difficulties. Average and poor reader control groups should still be included in pre- and post-testing. These provisions would facilitate the acceptable use of inferential statistics in evaluating the data.

3. Frequency of art sessions should be reduced to twice a week, but the duration of the program increased to at least ten weeks.

4. The art program should be integrated with reading instruction. Assisted drawing might be used to stimuluate language experience activities. The adult could verbalize the visual qualities of the object or scene, then record imaginative dictation from the child about what he has drawn. The child should gradually learn to use his own verbal cues to guide his drawing, and techniques used in art (such as representing the contour versus detail of objects) should be used in reading as well.

5. The task of integrating current theoretical approaches and empirical findings into a coherent art program is too massive to be accomplished in one program, and should be dealt with in more manageable units. One might focus on the development of verbal mediation skills in drawing and reading, or on the use of visual redundancy in gathering information.

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APPENDIX A

TEACHER REFERRAL FORMS

September 26, 1974

Dear _____,

As part of my Master's thesis research, I will be working with second-grade boys who have reading problems stemming from impairments in their visual processes. I will depend heavily on referrals from you and other second-grade teachers. This letter describes the fundamentals of my study and provides a form for referrals of boys for further testing and for a remedial program.

Briefly, the study involves determining the relationship between the drawings and the reading of boys with visual perceptual problems. If both reading and art abilities differ significantly from those of unimpaired boys, and if there appears to be a relationship between the type of reading difficulties and art characteristics, my literature research suggests that remediation of the lagging visual processes through art may increase reading abilities related to those same visual processes.

As a first step in diagnosing those boys with visual perceptual problems, your completion of the following referral form would be of immeasurable help. The referred boys will be evaluated with the Bender Gestalt test of visual perception, the Goodenough Drawing Test, and a reading test. If their test scores reveal consistent difficulties in the visual aspects of form copying, drawing, and reading, they will be invited to participate in a six- to eight-week art curriculum designed to improve their visual perceptual skills.

As a control, I will need to give pre- and post-tests to a group of average or above readers (boys only) who show no problems in visual perception. List all the boys in your class who represent the "norm" of second-grade reading.

Refer only those boys for remediation whose reading needs considerable improvement and who demonstrate at least two of the reading behaviors in the following list. Do not refer any children who seem to be emotionally disturbed or below average in mental ability.

Thanks so much for your help in this project.

Sincerely yours,

(Mrs.) Barbara McMillan

Directions: In the spaces provided below, list all the boys in your class whose reading is characterized by two or more of the difficulties described below. If a child has considerable trouble in any specific area, put the number of that area by his name.

1. Has difficulty scanning the page, finding his place, or focusing on the words in correct order.

2. Has difficulty focusing on the text at all; seems to be oblivious to the printed word.

3. Has difficulty relating separate bits of information; tends to focus on a single dominant feature of a word of phrase and ignores the rest. (Says d-d-d but not the whole word for dog.)

4. Reverses letters, groups or letters in words, or words in sentences. (Reads b for d; saw for was.)

5. Confuses words that look alike (ran for rat; hello for jello.) Mixes up similar letters within words (hand for band).

6. Doesn't seem to use the technique of "verbal mediation" in reading. This involves rehearsing what he reads to himself so he can connect what he reads to previous reading and thereby gain meaning from printed words.

7. Tends to repeat some words or sounds over and over.

8. Has difficulty predicting what might come next when he reads; makes absurd guesses when asked to fill in the blank.

9. Can't make any sense out of brief glimpses of printed material (filmstrips, flashcards, quickly erased blackboard writing).

10. Knows the components of words and sentences, but can't join them together meaningfully.

11. Forgets what he just knew.

12. Forgets words he knew several weeks ago.

13. Has trouble spelling.

14. Doesn't recognize words he knows in a new context. (He can read the in isolation, but doesn't recognize it when it is capitalized, or within a sentence.)

APPENDIX B

PARENTAL PERMISSION FORMS

Cover Letter from School Principals

October 16, 1974

Dear Parents,

Attached is a letter from Mrs. Barbara McMillan describing a program she is directing to help children with certain reading problems. Her program uses art activities to improve children's ability to make sense out of what they see - an ability essential to good reading.

Mrs. McMillan is currently a second-year graduate student in Child Development at VPI & SU. The information she obtains from working with children at Harding Avenue / Margaret Beeks will be used in the writing of her Master's thesis.

Approval for this project has been granted by Mrs. Charlotte Beamer, Elementary Education Supervisor for Montgomery County Public Schools. I have discussed the project with Mrs. McMillan and feel her work could be of great benefit in helping children with reading problems. Your cooperation in granting permission for your child to participate would be greatly appreciated.

Sincerely yours,

Mr. Gary McCoy / Mr. Douglas Morgan

Permission Form to Parents of Average Readers

Dear _____,

In my thesis research, I'm comparing certain skills of boys who are average readers with those of boys who have reading difficulties. Your son, _____, has been described by his teacher as being an average, or above-average, reader.

May I have your permission to include him in my project? This means that he'll be taking three tests with other second-grade boys: the Bender Gestalt test of visual perception, the Goodenough Drawing Test, and the reading section of the Metropolitan Achievement Test.

The test results of the average readers will help determine what skills poor readers are lacking, and help me formulate a remedial program for children with reading difficulties based on perceptual training in art. Thank you so much for your cooperation.

Any questions which you have will be gladly answered. During the day, call me at the VPI & SU Lab School, 951-6148. In the evening, you may contact me at home, 951-2049.

Sincerely yours,

(Mrs.) Barbara McMillan

***** ***** ***** ***** *****

Please detach, sign, and return with your son to his classroom teacher. If you do not wish to give permission for your son's participation, please write a note to that effect on this form and return it, so that I will have a record of your choice.

I give permission for my son _____ to participate in Barbara McMillan's project.

Date _____ Parent's Signature _____

Permission Form to Parents of Poor Readers

Dear _____,

Your child, _____, has been referred by his teacher as having reading difficulties which seem to be caused by problems in making sense out of what he sees. We call this a "visual perceptual impairment." This does not mean that your son needs to wear glasses, but rather that he may need special training in how to get meaning from what he sees.

My experience with art and reading has led me to several conclusions about these two areas:

1. When a child draws, his eyes and brain do many of the same things as when he reads.

2. If a child has trouble with reading because he can't make sense out of what he sees, he'll probably have trouble with drawing.

3. Nearly all children enjoy art, and most start drawing as a natural part of their development.

4. Practice in drawing and other art activities can help a child may sense out of what he sees, and should result in better reading.

5. Children who have trouble reading are often discouraged about their problem and are afraid to read. Art provides success for a child because there are seldom wrong answers in art. At the same time, the child can be getting practice in skills needed for successful reading.

The scores on three tests will help to determine if your son could benefit from a perceptual training program in art. These are the Bender Gestalt test of visual perception, the Goodenough Drawing Test, and the reading section of the Metropolitan Achievement Test.

Your permission is needed for the administration of these tests and for your son's participation in the remedial art program if it appears that he would benefit from it. After scoring the tests, I will notify you if your son is to be in the art curriculum. Boys qualifying for the program will spend about 30 minutes per day for three days each week over a 6 to 8 week period in art training. The sessions will take place at school, during the regular school day. Should I use your son's drawings or test scores in my final report, his name will not be used.

Any questions which you have about this project will be gladly answered. I can be reached during the day at the VPI & SU Lab School, 951-6148. During the evening, you may call my home at 951-2049. Thank

you so much for your cooperation.

Sincerely yours,

(Mrs.) Barbara McMillan

***** ***** ***** ***** *****

Please detach, sign, and return with your son to his classroom teacher. If you do not wish to give permission for your son's participation, please write a note on this form and return it, so I will have a record of your decision.

I give permission for my son, _____, to participate in Barbara McMillan's project.

Date _____ Parent's Signature _____

APPENDIX C

EXPERIMENTAL ART CURRICULUM

Development of the Curriculum

Specific philosophies and techniques of art training for young children were gathered from the literature (Bank-Jensen, 1962; Keiler, 1955; Lindsay, 1969; McIlvain, 1961; Sattler, 1970; Wirtenberg, 1968). The total file of art activities included exercises in visual-motor skills, crafts, and situations for the experimenter's own technique of "assisted drawing." This technique involves training the child to become both visually and mentally aware of the qualities of the thing which he is drawing. The art teacher verbally describes the visual characteristics and spatial relationships of the components of the actual model, as the child draws.

The program of activities was given a trial run during a five-week summer learning disabilities clinic. Volunteers directing the art center made written evaluations of each activity according to its practicality, usefulness in training skill areas, and enjoyment for the children. Activities which were evaluated as too difficult or frivolous were eliminated from the final art curriculum.

Observation of the initial response of the boys in the experimental group to the art activities influenced the development of the remainder of the curriculum format. The boys finished their art assignments quickly and needed two or three assignments for each thirty minute session. One crafts activity during each session was needed to maintain interest and provide success for each boy.

It was difficult to do assisted drawing with some of the subjects since they still drew spontaneously and seemed unable to control their

graphic responses to match the verbal stimuli about the model. Thus, it was necessary to minimize the structured requirement of the program initially, and gradually increase the demands of each assignment. Contour drawing and serial cutting were too difficult and frustrating to the boys, and were thus not worth their potential value as remediators of specific skills. By the end of the five-week period, the boys appeared to be losing interest in meeting three times each week for art, although they continued to complete assignments with care.

Primary Objectives

The central goal of this program was to improve the visual processes essential to both reading and art performance, specifically:

-systematic scan of the visual field
-figure-ground discrimination
-selective search of the visual field, with focus on
    directional cues
    component parts
    spatial relationships
    essential details
-disregard of irrelevant information
-vocal or subvocal rehearsal of visual information
-observation of redundant features
-prediction of content and meaning in other areas of the visual field on the basis of redundancy
-integration of fixations into complete visual images
-recognition of familiar elements
-attributing meaning to visual percepts
-integration of relevant visual information
-short- and long-term storage of meaningful visual information
-relating incoming visual cues to past experience with the visual world
-maintenance of form constancy of objects and symbols
-sequential relationships of visual information
-shift of focus to new stimuli for further information
-appropriate behavioral response

Specific Performance Objectives

1. The child will discriminate among like and unlike forms, and group sets of forms into related categories.

2. The child will join together the basic forms to make meaningful representational forms.

3. The child will discriminate among various line qualities (long, short, thick, thin, heavy, straight, faint, wavy).

4. The child will draw upon request lines of varying quality.

5. The child will verbally describe, and artistically represent the relationships among the parts of the human body.

6. The child will draw representations of humans in static and moving postions.

7. The child will reproduce objects in the environment by drawing.

8. The child will represent objects and persons interacting within the environment.

9. The child will graphically represent spatial relationships among objects and persons in the environment.

Specific Activities

Session #	Activity	Description
1	Contour drawing	Draw my hiking boot, trying to "feel" with your eyes and pencil all the bumps and smooth parts.
	Draw	Draw anything you want, but make it the best you can.
2	Draw design	Trace around these household objects, then color in parts to make a design.
	Decorate art folder	Use watercolor markers to decorate the folders in which you'll keep your art.

Session #	Activity	Description
2	Draw peer model	One child will sit very still while you draw him. Make him look in your drawing as he really does look now.
3	Draw peer model	On black paper, you will draw this child with white chalk, paying close attention to the shape of his body.
	Cut paper lace	Make cut paper lace, then draw the design it makes on another piece of paper.
4	Make measurers	Draw, cut out, and assemble a movable measurer which can be manipulated to show graph measurements.
	Draw Movable Man	Here is a cardboard man with joints that move. Draw him with all his joints.
5	Line quality	Here are some cards with different lines on them. Make a line like this one - wavy; now make one like this - straight, etc. Now choose two lines and make a picture with them.
	Draw teacher	Look at me carefully. Here is my head. What shape is it? Draw my head. What part of my body comes next? Draw it.
6	Contour drawing	Look at the outline of this boy. Draw him the best you can.
	Serial cutting	Now make a contour drawing on paper. Cut carefully along the lines, leaving connecting points at the edges. Unfold the paper, and you will have many shapes hooked together.
7	Draw chair	Draw this chair so that it looks like a chair.
	Line quality	Make rhythmic patterns on your paper using the lines on these cards.
	Contour drawing	Complete the other side of this contour drawing I have started of you.

Session #	Activity	Description
8	Draw self	Look into the mirror and draw yourself just as you look today.
	Writing	Using block letters, make a poster of your first name.
9	Body drawing	After I outline your body as you lay on this big paper, you cut it out and draw in your face and clothes.
	Peer drawing	I will cover half of this boy with a large sheet of paper. You draw the part you can see, and the part you cannot see. Predict how the other half looks.
10	Silhouette	While you sit here in the light, I will draw the shadow of your face. Then you draw your features in. Remember, when you sit like this, we can only see one side of your face.
	Letter art	Use these reversible letters to make designs: n/u; d/b; m/w; p/q.
11	Sgraffito	Color with crayons very hard on this cardboard. Use many colors. Now color over it with black crayon. Use the scissor point to scratch a design.
	Peer drawing	As you draw this boy, tell me what part you are making and what shape it had.
12	Marble painting	Lift two marbles out of this paint. Roll them all over the paper to make a design.
	Draw bicycle	Look at my bicycle carefully. Now draw it as I tell you the parts. Now I will hide the bike. Draw it from memory.
13	Swing-tail cat	Draw and cut out of cardboard this cat and his tail. Use brads to attach his tail. Now invent your own animal with moving parts.

Session #	Activity	Description
13	Draw yourself	Draw yourself, naming each part of you as you draw.
	Draw plumbing set	Put together this set of pipes and joints. Now draw it. Draw every connecting joint.
14	Draw the school	Look outside and draw the front of the school building. Include the windows, doors, and sidewalk.
	Draw peer	Draw the back view of this boy. Will he have eyes in the picture? Why?
15	Draw kaleidoscope	Look into the kaleidoscope and draw the design that you see. Now color it in.
	Feelie Box	Feel the object inside the Feelie Box. Draw what you feel. Now check to see it what you drew looks like what the object really is.

APPENDIX D

HYPOTHETICAL RELATIONSHIPS AMONG VISUAL, READING, AND ART DISORDERS

Visual Process	Related Reading Disorder	Related Art Disorder	Attempted Art Activities
Notice stimulus.	Difficulty scanning page, finding place, focusing on words in order (Frostig, 1968).	Little difficulty discriminating and representing large forms, though failure to include detail.	Place model against background with high contrast. Gradually increase visual noise in background.
Orient head and eyes to stimulus.	Inability to respond to visual information (De Hirsch, 1973).	Tendency to draw preconceived image of model rather than drawing directly from stimulus.	Verbalize exactly what is to be drawn, describing outstanding features. Child responds by imitating verbalization and drawing.
Visual search.	"Lazy" visual exploration. Focus on single dominant feature with blind guess about identity (Chalfant and Scheffelin, 1972).	Omission of detail, unwillingness to use purposeful visual search before drawing. Some difficulty with part-whole representation.	Expose a portion of model. Child guesses what rest might be on basis of available visual clues. Draws his guess; draws again after seeing whole model. Compare drawings.
Selectivity of essential visual information. -direction -order -essential detail	Inability to differentiate directional cues (Cundick & Robison, 1972). Reversal and rotation (Chalfant & Scheffelin, 1972). Inability to discriminate between similar words (Frostig, 1968).	Little difficulty with directional representation, except when asked to complete half-done contour drawings. Simplistic representation of part-whole relationships.	Verbalize essential features about model. Ask leading questions to bring child to awareness that directional placement of model makes a difference in how he draws it.

Visual Process	Related Reading Disorder	Related Art Disorder	Attempted Art Activities
Vocal or subvocal rehearsal of visual information.	Weakness in verbal mediation (Wilson, 1971).	Unwillingness to practice verbal rehearsal when drawing; tendency to draw without regard for teacher's verbalizations about model.	Say, and have child repeat, Here is a ____. See how the ___ connects to the___. How are you going to draw that part? Afterwards, ask child to tell about how he represented the model.
Disregard of irrelevant information.	Perseverative repetition of one part of word, neglect of others. Inability to ignore non-essential cues (Footlik, 1970, Chalfant & Scheffelin, 1972).	Little apparent difficulty, with the exception of tendency to include elaborate detail.	Say: What's the most important part of this? Why? What is not important? Draw only the things that are most important.
Observation of redundant features of visual stimuli.	Inability to pattern informational cues which are repeated in letters, words, sentence structures.	Difficulty drawing complex models such as jointed pipe structure or bike.	Say: What kinds of patterns do you see here? Block a part of the model and ask for predictions about the features of the hidden part.
Prediction of parts of visual stimulus on basis of observed redundancies.	Inability to draw on information gained from limited cues to predict what successive cues might be.	Little difficulty with familiar models.	Show half of model and ask for drawings of whole model based on assumption that both halves are alike.
Integration of separate fixations into complete image.	Inability to make sense out of brief glimpses of text.	Little difficulty with familiar objects since most drawings were based on mental image.	Show model for decreasing lengths of time; child draws what he remembers then checks drawing against actual model.

Visual Process	Related Reading Disorder	Related Art Disorder	Attempted Art Activities
Recognition of familiar elements in visual cues; attributing meaning to percepts.	Failure to gain meaning from print; failure to learn frequently repeated words.	Little difficulty, although some anxiety when presented with model which had never been drawn before.	Show model which is made of unfamiliar things in unique combination. Ask: What do you see that looks familiar?
Integration of visual cues into meaningful visual image.	Inability to unify details into one complete percept. (Chalfant & Scheffelin, 1972).	Difficulty drawing part-whole relationships in complex, unfamiliar model.	Call attention to the component parts and their function in the whole model.
Matching stimulus with stored visual images.	Inability to transfer formal characteristics to new situations, read old word in new book. (Frostig, 1968).	No difficulty matching stimulus with existing image, but tendency to overgeneralize,make all human models look same.	Call attention to similarities and differences among boys who sit as models. What formal and featural elements do they have in common?
Visual memory.	Inability to recall word just learned, or learned weeks ago.	Little apparent problem.	Show model, remove. Draw. Draw again the next day. Check drawings against actual model.
Shift of focus to new stimuli on basis of redundancy and prediction.	Perseveration on isolated words or letters.	Unwillingness to verbalize or attend to teacher's verbalization. Little perseveration except with details.	Verbally guide children through drawing act by describing model in detail. Have children describe model and how they will draw it.
Making appropriate behavioral response.	Failure to say words, sentences when confronted with print.	Occasional unwillingnessto draw model, especially if unfamiliar.	List specific behavioral objectives which gradually approximate reading behavior.

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AN EXPERIMENTAL ART CURRICULUM FOR THE REMEDIATION OF VISUAL PERCEPTUAL IMPAIRMENT AFFECTING READING

By

Barbara D. McMillan

(ABSTRACT)

The study investigated the qualitative differences between the human figure drawings of average and poor readers with visual perceptual problems, and measured the effects of an experimental art program on the reading, drawing, and design copying abilities of poor readers.

Comparison of pre-test scores on the Goodenough Drawing Test, the Bender Visual Motor Gestalt Test, and the reading section of the Metropolitan Achievement Test revealed significant differences between the average readers (N = 26) and the poor readers (N = 24). An analysis of specific errors on the Bender and Goodenough tests indicated certain items characteristically failed by the poor reader group.

After implementation of the art program to a group of eleven poor readers, comparison of pre- and post-test scores of all groups on the three measures revealed only that the average readers scored significantly higher on the reading measure than either the experimental or poor reader control groups. The Goodenough adjusted post-test mean of the experimental group was numerically higher than the scores of the average or poor reader control groups, suggesting that the art program had positive effects on the human figure drawing abilities of the experimental group.