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ABSTRACT

Future assessments and instruction in reading in the primary grades will shift from a task oriented analysis toward a learner centered analysis designed to determine what the learner contributes to his or her own learning. Thus a "cognitivistic-mentalistic" rather than a behavioristic analysis of the reading act will occur. However, future instructional trends will not and should not eliminate the positive attributes of the structure of scope, sequence, and pacing that are inherent in various basal reading programs. Diagnosis and instruction may be influenced by what we learn about factors such as specialized brain functioning, auditory-visual integration, bioneurological differences between boys and girls, and cognitive style. Instruction will be differentiated by factors related to what an individual can learn and how the individual might learn most efficiently, rather than by when instruction "should" occur. Though traditional diagnostic procedures will continue to dominate the educational setting, the enriched perspective that may result from the understanding of learning factors such as auditory-visual integration abilities may help us to understand the more difficult cases of reading problems where individuals were unable to originally develop particular skills or could not take advantage of subsequent concentrated instructional activities aimed at teaching these skills. (HOD)

Future Trends of Diagnosis and Instruction in the Primary Grades

John P. Helfeldt

Introduction

At the present time, the practices of educational assessment and intervention seem to occur as separate and discrete procedures. This two step process appears to be based on the "medical model" which works more effectively in that discipline because the science of medicine (at least in many specialty areas) appears to have developed some rather precise diagnostic techniques and subsequent, clear-cut treatments.

The present separation between educational diagnosis and instructional intervention appears to be related to the definitive precision and quantification fallacies that many educators ascribe to various traditional diagnostic instruments that are in widespread use. All too frequently educators associate a high degree of precision, comparable to that of an x-ray and a surgeon's scalpel, with diagnostic reading instruments whose formats and conceptual bases have not been appreciably changed since their initial publication dates. This ingenuous acceptance of tests has continued for two decades even though a great deal has since been learned about the nature of the reading act, the learner, and the interaction of these two major factors in the learning to read process. While basic measurement concepts such as confidence intervals, validity, reliability, and standard error of measurement may go unheeded, perhaps new findings and diagnostic procedures in other disciplines such as neuropsychology, medicine and educational psychology will influence our diagnostic-prescriptive model. A more comprehensive understanding of the learner

and the learning process, which educators should gain from the research-based findings of these other disciplines, may lead to a more continuous and more inclusive concept of diagnosis and instruction of individuals manifesting specific reading or learning problems.

While a medical patient experiencing difficulties with a malfunctioning gall bladder can be diagnosed, surgically treated, and cured within a week or two, educators will come to realize that reading problems are not as readily excised and cured as digestive tract maladies. One major explanation of why reading problems are very difficult to identify and understand is related to the brain and its functioning in the reading process. We cannot just look at a cross section of a reading performance and determine what the problem is and then quantify it. We need, in many instances, to look at probable explanations of why the problem might exist and what (if anything) can be done to minimize or eliminate the problems. With these concerns in mind, this article will concentrate on the learner and present ideas related to the topics of: 1) A Learner Centered Analysis and Instruction; 2) Cognition and Brain Functioning; 3) Intersensory Integration; 4) Differential Reading Performances of Boys and Girls; 5) Cognitive Style and Reading Performance.

Learner-Centered Analysis and Instruction

In addition to applying our knowledge of diagnostic instruments and procedures developed within disciplines beyond education, future assessments and instruction will shift from a task oriented analysis toward a learner centered analysis designed to determine what the learner contributes to his or her own learning. Reading will be viewed as an active process which occurs as a result of the interaction of background

and informational factors that the learner imposes on the task, rather than a reaction to what the task imposes on the learner. To state it more directly, a cognitivistic-mentalistic, rather than a behavioristic, analysis of the reading act will occur.

According to behavioral theories of learning, the learner is a passive receptor of environmental influences, thus content, pacing, sequencing, and reinforcement are viewed as the prime variables in learning. This "jug and mug" approach to learning, where a teacher carefully measures out the perfect amount of instructional activities, is linked to many of of our highly structured, sequential sets of instructional materials. In this type of approach the primary source of instructional differentiation is the pace, rather than the substance or kind, of teaching-learning procedures. This behavioral perspective is evident in many classroom reading programs when the various reading groups can be observed to be getting the same type of directed reading lessons and skills reinforcement from the same published or teacher-made instructional materials. It appears that the difference between the "bluebirds" and the "blackbirds" is not viewed in terms of <u>how</u> they can best learn. Instead, the difference seems to be viewed in terms of <u>when</u> the blackbird group will receive an "instant replay" of the bluebirds' lesson.

Cognitive-mentalist theories, on the other hand, perceive the learner as being actively involved in learning, where stimulation is essential but insufficient by itself. This implies that the factors of content. pacing, and reinforcement are at the learner's discretion, not the t her's. The focus of Piagetian assessment and intervention

has influenced the cognitivistic-mentalistic attitude toward learning. Generally, studies comparing active and passive learning have revealed that active participation is much more potent. During the past 15 years studies of perceptual learning, concept learning, memory storage and retrieval, and language learning reveal that active learner processes are involved. The reading process seems to be a synthesis of all of these particular types of learning. It seems to be an active process where the individual imposes information, attitudes, and values on the text. Thus, the learner's placement of certain expectations on the printed stimuli is a perspective which behavioral models of learning seem to ignore.

Human language capabilities as mediating factors in active learning processes should also be considered to a greater extent. The importance of language in human thinking has been aptly stated by Bruner (1964).

> "In effect language provides a means, not only for representing experience but also for transforming it....Once the child has succeeded in internalizing language as a cognitive instrument, it becomes possible for him to represent and systematically transform the regularities of experience with far greater flexibility and power than before.: (pg. 4)

Neurologists and linguists have reported information regarding specialized language processing portions of the brain such as Broca's and Wernicke's areas which are present in humans but not in lower animals. The fact that the human brain is much more highly developed than that of lower animals, and that language capabilities appear to be uniquely associated with humans, should cause us to look beyond behaviorism now, and certainly in the future when we investigate the learning of higher level cognitive linguistic tasks such as reading.

While the task performance oriented view of the behaviorists should not be dismissed, we must consider this perspective differently than we have in the past. We must carefully contemplate the evidence which disproves the assumption that slower pacing and increased opportunities for repetition will remediate reading problems. In a similar manner we must realize that the learner-based, unimodal information processing point of view is equally lacking empirical support in differentiating between good and poor readers. Furthermore, training in the skills of auditory or visual perception and perceptual-motor areas does not have an appreciable effect upon the remediation of most reading difficulties.

Future instructional trends will not and should not eliminate the positive attributes of the structure of scope, sequence, and pacing that are inherent in various basal reading programs. Impending training may be differentiated on the basis of learner characteristics and how they interact with the demands of the learning task. Instead of investigating unimodal information processing and randomly manipulating reading task variables, other areas closely related to individual learner characteristics will be examined. Diagnosis and instruction may be influenced by what we learn about factors such as specialized brain functioning, auditory-visual integration, bio-neurological differences between boys and girls, and cognitive style. Thus, instruction will be differentiated on factors related to what an individual can learn and how he might learn most efficiently, rather than merely looking at when instruction should occur.

Cognition and Brain Functioning

As we look at cognition and brain functioning as it might apply to learning to read we might start with a familiar statement made by Allen and Halvorsen (1961).

> "What I think about, I can talk about.
> What I can say, I can write (or someone
> can write for me).
> What I can write, I can read (and
> others can read, too)...."

At first glance this statement appears to be quite logical and correct. It implies that proficiency in one type of language situation will guarantee proficiency in other language processes. More specifically, this statement implies that oral language and written language are virtually the same. However, when viewed more analytically and from a neurological perspective, certain reservations arise.

While responding to oral and written language stimuli are related functions, there are some different processes involved within each of them. That is, different portions of the brain are stimulated when an individual reads or pronounces a written word than when a spoken word is repeated. Figure 1 illustrates the areas of the brain that are stimulated when a person makes an oral response to a written word. It appears that the (1) primary visual area of the brain is originally stimulated, followed by the (2) angular gyrus (which mediates between the original visual information and the auditory pattern for the word which exists in (3) Wernicke's area and transmits information through the (4) arcuate fasciculus, to (5) Broca's area (where the auditory information is encoded into an evoked program for articulating the word), and finally to the (6) motor cortex of the facial area (Geschwind, 1979).

(INSERT FIGURE 1 ABOUT HERE)

Figure 2 reveals the areas of the brain that are stimulated when a person repeats a spoken word. Initially, the (1) primary auditory area of the cortex is stimulated. Then (2) Wernicke's area, followed by (3) Broca's area, and finally the (4) motor cortex of the facial area is activated (Geschwind, 1979)

(INSERT FIGURE 2 ABOUT HERE)

The basic examples of differentiated brain functioning have direct implications for the procedures of using an auding or listening comprehension level to determine the reading capacity of an individual. This procedure might have some predictive validity for what appears to be efficient, developmental readers, but it seems to have little practical value because we are not typically concerned with these individuals' reading capacity levels. Ordinarily, we assume that these individuals are reading at or near their capacity levels anyway. The examples of differentiated functioning presented by Geschwind, along with the blood flow studies of the brain reported by Lassen, et. al. (1978) make it quite apparent that listening and reading are related, but different language processes. Because different parts of the cortex are stimulated in each of these situations, one should not infer that a person capable of processing information through listening, could automatically process this same information through reading. Further, if we are using this procedure with individuals who are experiencing observable difficulties in reading we cannot assume (as we might with a proficient developmental reader) that the information is being processed efficiently, or that this processing capability is intact. Future research may, for example, seek

to determine the frequency with which areas such as the angular gyrus or primary visual area of the cortex are not appropriately stimulated (in terms of sequence, rapidity, or intensity) during the reading acts of disabled readers who seem to possess normal oral-aural language abilities.

Specialized brain functioning is not the sole basis for questioning the content and construct validity of listening comprehension as an indicator of reading capacity. There are legitimate linguistic cue based concerns with this procedure as well. A closer look at these two processes seems to indicate that there are as many differences as there are similarities between listening and reading. When a person is listening to language, the reader or speaker supplies semantic and syntactic clues to meaning by presenting appropriate stress, pitch, juncture, and intonation cues. These cues are not provided for individuals who are reading. Instead, the individuals must generate these cues on their own. Another perspective regarding the listening task reveals that the listener does not need to recode and integrate the visual representation of language with its oral or aural counterpart. The reader on the other hand, must be concerned not only with the integration of these two codes, but he must also rely upon the orthographic and grapho-phonemic cue systems which are of little or no concern to a person in a listening situation.

As the neuroscientists report more information about the specialized functioning of the brain, educators will be tempted to revisit the concepts of hemispheric dominance and lateralization. On the basis of observed idiosyncratic patterns of laterality in a university population, Buffery (1976) cautions us against seeking a simplistic hypothesis

regarding crossed laterality as being a sufficient condition for a learning disability. While auditory perception and language comprehension have been associated with the left hemisphere and visual-spatial information processing has been associated with the right hemisphere, more emphasis will need to be placed upon the investigation of integrated functions which must apparently occur when we associate the graphic stimuli on the printed page with our auditorily-stored knowledge of words and ideas.

Intersensory Integration

Laboratory studies employing dichotic listening and hemifield tachistoscopic methods of stimulation are providing more information about the rate and nature of the lateralization of language to the left hemisphere. In the everyday world, however, we must remember that lateralization of function cannot be accurately measured or even observed because visual-spatial and auditory-linguistic stimulations are generally received in a concurrent manner in both hemispheres, and they are readily transmitted to the opposite hemisphere through the corpus callosum and other bundles of nerve fibers. While the left hemisphere is predominantly responsible for linguistic information processing, various studies reveal that the right hemisphere does possess some rudimentary linguistic capabilities which apparently contribute to the overall language processing capacities of individuals. This premise has been illustrated by Buffery (1976) through a "split load" laboratory technique where each hemisphere of the brain is simultaneously stimulated with different information. Among the results, Buffery reported that subjects were able to process visual picture stimuli presented to the left hemisphere and auditory word stimuli presented to the right hemisphere. This procedure indicates that visual-

spatial and auditory-linguistic information can be dealt with (at least initially) in the hemisphere that is not ordinarily dominant in the processing of each respective type of information.

With these comments in mind, educators need to be cautious of possible "lateralist educational cults" which seek to directly transfer laboratory research methods such as dichotic listening to the classroom. While research may eventually support such instructional procedures, we should look with care upon the practices of individuals such as van den Honert (1979) who teaches phonics to children with one eye blocked, and employs stereophonic head sets to deliver spelling tests in one ear while piping soft music to the other. While van den Honert has claimed "stunning successes" for 20 out of 75 children by employing these methods which are aimed at getting disabled readers to use the "correct" side of the brain for reading, her methods need to be empirically substantiated before we hop on this latest educational bandwagon.

Before this type of procedure is used for instructional purposes, perhaps dichotic listening tests will be developed for diagnostic purposes to help determine the degree to which lateralization of language processing is present or absent in disabled readers. This <u>may</u> then, have implications for the type of instruction that could be most advantageous to the child.

In addition to surveying the brain function studies, we might take a behavioristic view of some subskill models of reading and learner performances on tasks which require the integration of graphic, visual-spatial stimuli with oral-linguistic stimuli as indicators of possible integration or interfacilitation of functions between specialized areas within and between the two hemispheres of the brain. Many models of reading are based upon some hierarchical arrangement of subskills. Within

these subskills models there seem to be two major types of arrangements called the assembly type and the systems type. If the hierarchy of skills are somewhat discrete as determined by a low correlation and an even lower degree of common variance among subskills, then the reading model is based on an assembly type of arrangement. If, on the other hand, the subskills are highly correlated, with a high degree of common variance, they are more integrated or interrelated and reflect a systems model.

Perhaps the difference between the discreteness of the assembly model and the interfacilitation of the systems model is one of the ways at looking at differences within and between good and poor readers. Guthrie (1973) reported that subskills among normal readers were highly intercorrelated, while the subskills among disabled readers were not highly correlated. The findings of Guthrie, therefore, lend support for a systems model of reading and the concept of integration or interfacilitation of subskills in the process of successful reading.

Shifting from a model of proficient reading which is based on the integration of subskills, we might focus on the necessity for a reader to be able to integrate and shift between visual and auditory skills in order to read. Various studies tend to confirm this hypothesis as they report that single modality abilities do not help differentiate between good and poor readers. Jorgenson and Hyde (1974) reported that the skills of auditory discrimination and auditory memory were not related to auditory-visual integration abilities in first graders. Larsen and Hammill (1975) found the same lack of relationship between visual discrimination and visual memory, and auditory-visual integration. Further, and perhaps more importantly, these investigators found auditory-visual integration ability to be highly correlated to reading vocabulary abilities in first grade subjects,

While the factor of auditory-visual integration has great potential for future application in diagnosing reading difficulties two cautions should be observed. First, much of the data that has been reported has been of a correlational nature. Causation should not be inferred, unless we wish to run the risk of misinterpreting research results. Second, the auditory-visual integration research instruments used in many instances involved the association of pencil tap patterns with printed dot patterns, or light flashes with tone patterns. Performances on these non-linguistic, non-graphic tasks probably do not have a great deal of direct application to reading.

Rozin, Bressman, and Taft (1974) developed the "Mow-Motorcycle Test" to determine young readers' and non-readers' awareness of the basic relationship between the spoken and written word. The results indicated that non-readers were unaware of the fundamental relationships between the length of a printed stimulus and the length of utterance associated with it. The "Mow-Motorcycle Test" procedure does lend itself to possible use as an indicator of auditory-visual integration because the task involves the association between the printed forms of two words such as mow and motorcycle with the spoken form of one word such as "mow." The subject, then, needs to make the correct visual-auditory association or match between the visual and spoken form of mow. The adaptation or extension of this type of procedure with non-readers, pre-readers, problem readers, and developmental readers may provide helpful diagnostic insights about the auditory-visual integration abilities of individuals within each of these groups.

If findings with words or word-like stimuli are consistent with the earlier studies employing dot patterns and pencil taps, then we

may be able to make more direct application of the intersensory integration theory to the teaching of reading.

Why do Boys and Girls Differ in Reading Performances?

It is a generally accepted fact that primary aged males experience a greater degree of difficulty in learning to read than do their female counterparts. Up to this point, the most acceptable rationalizations for this phenomenon have been based on maturational, social, and cultural factors. One very common explanation for the inferior performance of primary aged boys is the differing rates of maturation between boys and girls. This hypothesis is difficult to comprehend because the term maturation is frequently not specific or operationalized, and it yields to a degree of nebulousness which makes it almost meaningless. Another explanation for the differences in reading performance is based on the classroom environment being geared more to the needs and abilities of girls rather than boys. A third, somewhat more specific rationale for boys' lack of performances rests on the socio-linguistic premise that boys and their fathers view reading as a feminine task (Mazurkiewicz, 1960). When the boys' less than conducive interests and attitudes toward learning to read are added to society's stereotypic sex role expectations for them to be athletic and aggressive, it's no small wonder that they generally get themselves into more trouble in school and pay less attention to reading instruction. While these explanations appear to be justified and certainly should not be taken lightly, they may be indicative of symptomatic factors or secondary causative factors.

Recent psychological, educational, and medical research indicates that many differences between male and female learning behaviors are

to sex-linked biologically inherent differences in brain functioning. Various infant stimulation studies have reported on enhanced auditory reactive behavior by female infants over male infants. This increased responsiveness to sounds and voices persists at least through the school years. Infant boys, on the other hand, attend to visual stimuli such as geometric shapes or flashing lights for longer periods of time than do their female counterparts. Restak (1979) reported that nursery school and pre-school aged boys performed with greater success than girls of the same age on visual imagery tasks involving the folding of paper and the rotation of objects. Restak also reported that for more complicated spatial concepts such as mentally manipulating a piece of paper to form a certain shape, EEG studies indicated that boys more consistently activated the right hemisphere of the brain and girls more frequently activated both hemispheres while attempting to complete these tasks. This could be interpreted to mean that girls rely more on language as an intermediating factor in solving problems of a visual/spatial nature. Further, the fact that language tends to become lateralized at an earlier age in females may help to explain this increased use of left hemisphere stimulation and language mediation to assist in the processing of visual-spatial information.

An unpublished study by Rose (1977) extends the findings of the infant and preschool studies involving the relationship between sex and brain functioning to the first grade level. In a study involving 25 boys and 25 girls, Rose reported that male subjects performed tasks of visual discrimination, visual memory, and visual imagery at a level significantly superior to the female subjects. The female subjects performed tasks of auditory memory and auditory imagery at a level which was superior to the functioning of the male subjects.

Further investigation of the sex linked brain functioning relationship may cause us to change our outlooks from the schools as well as possibly changing the schools. While individual boys and girls may be able to compensate for some of their differences in brain functioning, certain implications may be inherent in terms of looking at performances of boys and girls who do not compensate. Perhaps our demands and expectations in certain visually or auditorally based learning tasks need to be modified or at least perceived and interpreted with this additional information being taken into consideration. More specifically, we might have different expectations for boys and girls regarding their abilities to perform on certain auditorily or visually based tasks. This modification might not be the acceptance of inferior performances on these tasks. Instead we might provide different guidance during instructional activities and allow more time for some individuals to complete a task.

We might have to consider reading problems, learning disabilities, and hyperactivity within the context of the brain function data base. Perhaps the differences in brain functioning is at least a partial explanation of why 95% of all "hyperactives," (along with an almost equally high percentage of learning and reading problems) tend to be boys. The general findings of research studies support the premise that the male brain seems to be more visually oriented and learns through active manipulation of the learning environment. Yet classrooms and many academic learning tasks demand a great deal of attentive listening accompanied by long periods of quiet sitting. While long stretches of sitting, inherent in some primary classrooms, are not conducive to boys or girls, the listening and auditory language activities tend to be geared more toward the neurological processing abilities of girls. If teachers were

more aware of these differences, perhaps Manning (1966) would not have been able to report that teachers found boys' classroom behaviors to be disturbingly different than girls' and the resultant differential treatment of boys and girls, in terms of approval, would not have occurred.

While individual differentiations for instruction should not be based on group phenomena, there may be some implications for the instructional procedures that we employ with boys and girls. As if the foregoing factors were not enough, if we toss in a large dose of language experiance or intensive phonic instruction into the setting, it's not too surprising that we have a few boys who cannot read very much, may be learning disabled, and are a little hyperactive as well. While we take basal reading publishers to task for sex-role stereotyping, and we investigate the effects of various socio-cultural factors to explain why boys and girls might have difficulty in learning to read, we cannot continue to ignore brain-sex differences, for we do so at the risk of "...confusing biology with sociology, and wishful thinking with scientific facts." (Restak, 1979, pg. G5)

From a diagnostic point of view, the development of dichotic listening tasks may be able to provide us with some insights into how an individual, boy or girl, might process information in the reading task. Then we might be able to relate this to different approaches to initial reading instruction on more than a random trial and error basis, or at best some global (high, average, low) readiness determination.

In terms of instruction, there may be some basic implications for employing different procedures for the initial teaching of reading to boys and girls. One temptation for educators might be to dwell on the evidence which indicates that the difference in the rate of language

lateralization for boys lags behind that of girls by about one year. Based on this recurrent research finding, then, direct reading instruction for boys would be delayed. This delay may prove to be advantageous for some teachers and learners, but this information needs to be considered in conjunction with shifts in the nature of instructional procedures or methods. Boys for example tend to rely more on the visual-spatial information processing of the right hemisphere. Rather than merely delaying instruction, we might use procedures which emphasize the perceptual processing of the visual stimuli in the reading process instead of presenting instruction relying heavily on speech sounds and/or psycholinguistic hypothesizing. In support of this adaptive instructional perspective, Bakker, et.al. (1976) reported that proficiency in early reading is associated with dominant processing of information in either hemisphere. The reading performance, however, for right hemisphere processing is slow and accurate while the left hemisphere processing is punctuated by a more rapid, less accurate performance.

If we were to consider these differences in performance, the basic procedures and methods of initial reading instruction might differ from what we typically employ. For children who tend to be reliant upon their visual-spatial processing abilities, we might provide training to increase their rate of recognizing words of decreasing discriminability. In addition to practice in faster recognition of words with increasing degrees of orthographic similarity, children might also receive practice in increasing their rates of reading fluency through the use of specific procedures such as the repeated readings technique (Samuels, 1979). For children who might be less reliant upon the visual processing of the orthographic cues, training emphasizing language experience activities

along with exercises on using contextual constraints and minimal phonics to facilitate psycholinguistic hypothesizing, would be advantageous.

A final word of caution, however, is that we must not fall into the "all or none instructional trap" that has appealed to educators in the past. The idea is not to entirely withhold language experience activities from one group at the expense of rapid tachistoscopic recognition of highly similar words. The premise is that the degree of emphasis placed on various types of reading and language training activities might be differentiated for children within and between these two different groups. The primary emphasis will be placed on what the learner can do, this creating a success oriented program, while a secondary emphasis will be placed on giving a learner limited, carefully guided instruction in areas where he may experience a greater degree of difficulty.

Cognitive Style and Reading Performance

The relationship between an individual's cognitive style and their ability to learn to read has been investigated in recent years. Many studies have investigated the factor of cognitive style through determining the conceptuo-tempo of a learner. Subjects in these studies were then classified as being impulsive or reflective. Generally, research results indicate that reflective thinkers are better readers than impulsive ones. Many schools and teachers, however, tend to emphasize impulsive performances as they reinforce speed of responses by bestowing privileges upon the first child finished with their reading or other tasks of an academic nature. Impulsive thinkers tend to be faster but less accurate than reflective thinkers. Conversely, reflective individuals tend to be analytic and to consider various alternatives before responding to a question.

There have been studies which have investigated the relationship of conceptuo-tempo with performances on specific reading related tasks. The findings of Readance and Baldwin (1978) and Erickson and Otto (1973) may have direct implications for the nature of reading instruction for individuals with differing cognitive styles. Readance and Baldwin reported that reflective individuals performed significantly better than impulsive individuals on a word recognition task that followed synthetic phonic instruction. These differences between the two groups did not exist on a word recognition task that followed an analytic phonic approach.

Erickson and Otto, in a study concerned with the effect of intralist similarity among items on a word learning task, reported that training reflective individuals on a list with high intralist similarity had a positive effect on a word recognition transfer task. For impulsive individuals the degree of intralist similarity did not appear to be a facilitating factor on the transfer task.

The findings of the two studies mentioned above, need to be investigated further. But, we might tentatively conclude that associating cognitive style (in terms of impulsivity or reflectivity) with specific instructional approaches may facilitate children's abilities to learn certain subskills involved in the act of reading. The principle of minimal contrast may, for example, be warranted when we are teaching word recognition strategies to children who possess a reflective cognitive style. In the future, we may also alter the nature, as well as the amount of phonic instruction in conjunction with our awareness of the conceptuo-tempo of the learners. With further empirical verification, we might tend to expose reflective individuals to a synthetic phonic approach.

Witkin (1962) has presented the construct of Field Articulation to reflect different cognitive styles of learning. According to the research results summarized by Friedman et.al. (1976) field independent individuals perform better than field dependent individuals on tests of verbal learning, verbal fluency, and verbal prediction. Each of these processes has been associated with left hemisphere function. On the other hand, field dependent individuals seem to have an advantage on tasks of memory for forms and memory for faces. These abilities have been associated with right hemisphere brain function. Based on these findings, it appears that cognitive style, at least with reference to the construct of Field Articulation, may be a reflection of hemispheric preference or dominance in information processing. If this relationship is confirmed in subsequent studies, it will undoubtedly have many implications for diagnosis and instruction, some of which have been presented in the previous discussion regarding lateralization, intersensory integration and the information processing preferences of boys and girls.

Presently, "The Matching Familiar Figures Test" (Kagan, 1965) has been the basis for classifying the cognitive styles of learners in terms of impulsivity and reflectivity. "The Rod and Frame Test" (Witkin, 1962) and "The Embedded Figures Test" have been used to identify the cognitive style of learners in terms of field dependence and field independence. As the influence of the cognitive style variable becomes more thoroughly understood and more widely applied the development of additional instrumentation, as well as further refinement of existing instruments, will be needed to provide added validity and reliability in the identification of the cognitive styles of learners. Once this is accomplished, there will be other basic questions that will need to be answered.

When the facilitative relationships among cognitive styles, teaching procedures, and learning abilities become more firmly established and more clearly indicated, we might be tempted to try to change a person's cognitive style. The following basic strategies which have been used to increase the degree of reflectivity among learners are: 1) modeling by teachers; 2) delayed response techniques; 3) considering explicit alternatives, where various alternatives are explained, but the learner selects the most appropriate one; 4) considering consequences, where the learner is allowed to complete a task one way, but is also shown another way of completing a task while making comparisons and considering the consequences of the alternative strategies. The tactic of changing the person to meet certain demands of the task may not be functional for all learners. In fact in many cases it may prove to be impossible, and should not be attempted. In these instances, we will obviously need to manipulate the demands of the learning task to be more congruent with the learners' propensity toward a particular cognitive style. Understanding the instructional strategies which may be more effective with certain cognitive styles may be more important and perhaps more conducive to learning from a developmental point of view. For example, field independence seems to be developmental in nature. Therefore, trying to teach field independence may not be a very practical approach. Instead, we might try to employ some general procedures such as: 1) modeling and imitation; 2) immediate social rewards and reprimands; 3) working cooperatively as group members, which seem to facilitate learning in field dependent individuals.

Another basic area of concern that could have far-reaching implications for future diagnosis and instruction centers around the possible interactions among cognitive style, hemispheric preference for information processing,

and various reading related tasks such as isolated word recognition, paragraph reading, and comprehension. At this time, there appears to be some evidence to support a direct relationship between field dependence and right hemisphere processing and field independence and left hemisphere processing. However, the relationship between conceptuo-tempo and hemispheric dominance seems to be somewhat less clearly defined. From one perspective, it appears that the slow accurate behaviors of reflective individuals may be congruent with the slow accurate performance that Bakker et.al. (1976) have associated with individuals who rely upon right hemisphere processing. If right hemisphere dominant individuals are also reflective, this would tend to be consistent with the findings of Erickson and Otto (1973) who reported that reflective individuals could take advantage of a treatment based on high intralist similarities to facilitate a transfer task of word reading. On the other hand, the facilitative effects of synthetic phonics on the word reading performance subjects in the studies reported by Readance and Baldwin (1978) are not compatible with the hypothesis relating reflectivity with right hemisphere precessing.

It seems to be quite apparent that this last area of concern will need to be researched systematically and extensively before we try to make any premature and all too general applications to the processes of diagnosing and teaching children who have been identified as disabled readers. The apparent equivocation related to lateralization of hemispheric preference and cognitive style may not even exist because the studies are not directly comparable. The subjects and the reading subskill treatments in each of the studies were quite diverse. Consequently, we need to resist the temptation to compare "apples and bananas" at this point, in an effort

to avoid undue confusion. While the task may seem to be complex, it will be a beneficial endeavor that will necessitate increased communication between researchers and practitioners within and among various disciplines. It will also be reliant upon the application of more sophisticated multivariate statistical procedures to replace the univariate procedures which permeate the reading research studies of the present.

These multivariate analyses will enable educators to directly analyze the interactions of various learner factors as they occur within and between the same group of subjects. Thus, the results will have greater validity than some of the inferred interactions that we attempt to create by comparing results across similar studies which are not as expressly related as we would wish them to be.

Summary and Conclusions

This article has focused on internal learner factors that influence the manner in which reading abilities may be acquired. Important environmental, social, cultural, and linguistic variables were not emphasized because many of these factors are currently receiving widespread attention elsewhere.

The contributions of behaviorism will be considered in conjunction with a cognitivist-mentalist perspective regarding reading instruction and diagnosis. More time and energy should be expended on identifying and understanding primary or internally based learner attributes which affect reading performance, rather than completing further task analysis of models of reading.

Future investigations will concentrate on specific, specialized brain functions as they relate to reading. Educators cannot look to the brain

for all of the answers to reading disabilities, but this seems to be a productive topic of exploration that may assist us in our search of why a particular Johnny or Suzy can't begin to learn to read. Presently, we know very little about the brain. Interative research efforts will need to be mounted to gain a more comprehensive and applicable understanding of the infinitesimal bit of knowledge that we do possess about the brain and how it works. At this point in time, it appears that this area of study may have vast implications for future diagnosis and instruction.

Some of the ostensible knowledge of brain functioning that we do possess, may cause us to analyze our diagnostic and instructional procedures in a more critical manner. Without a doubt, reading is a language process, but we must consider its discreteness, as well as its conformity, to other language arts. Converging on the commonality of linguistic functions in reading and other language processes may be appropriate for developmental readers, but we must investigate the disparities when there is a lack of performance on the part of the disabled readers.

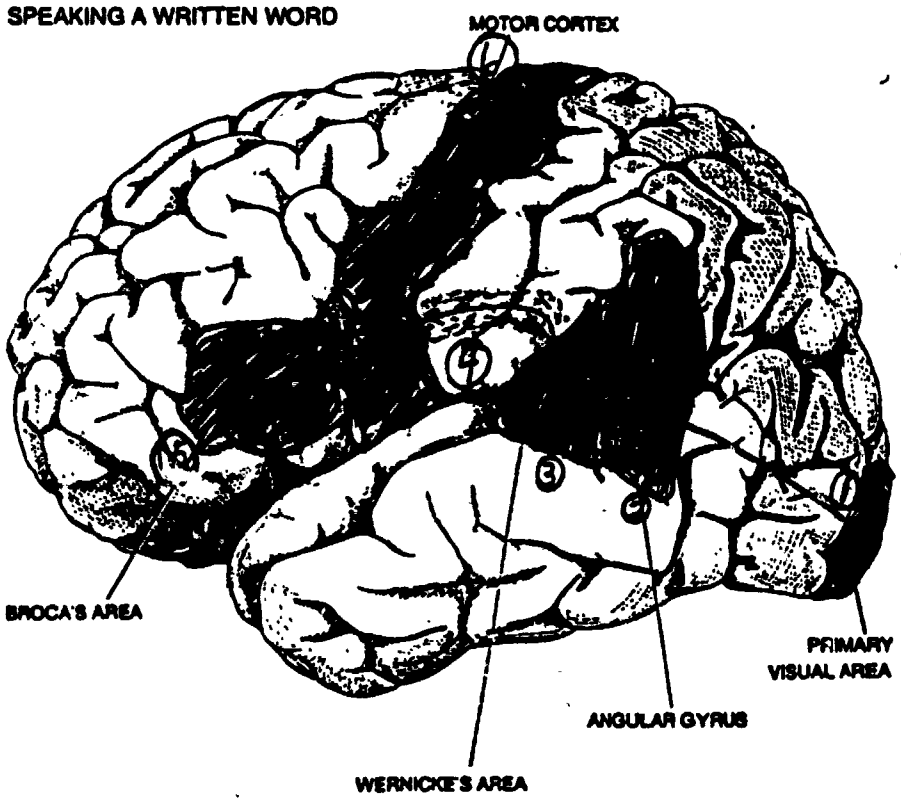
The topics of hemispheric dominance and laterality will need to be viewed with considerable discretion before we jump headlong into the classroom or clinic with laboratory research procedures. Visual-auditory and spatial-temporal integration may be an appropriate (and perhaps less controversial) research topic to consider in our quest to identify underlying factors that contribute to the differential performances of good and poor readers.

We might diversify initial reading instruction based on the interaction of learner variables such as cognitive style, gender, and hemispheric preference. A more enlightened use of existing instructional procedures,

rather than appealing to a "Madison Avenue Panacea" or an "off beat cult", will be the foundation for more efficient, effective reading instruction.

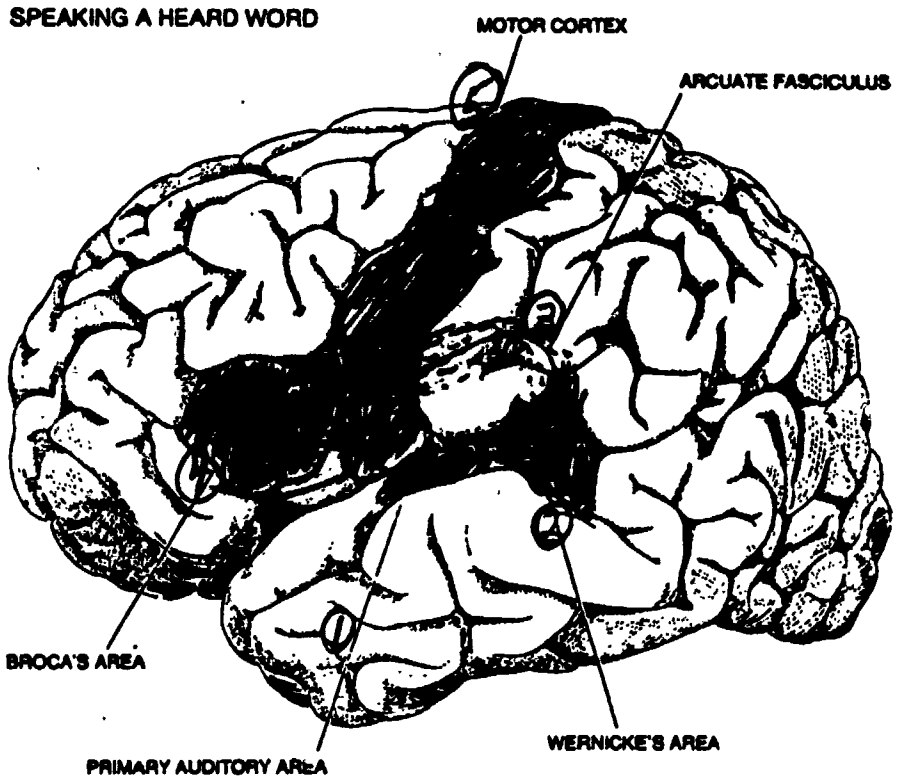
Traditional diagnostic procedures will continue to dominate the educational setting. As in the past, these procedures will be adequate for identifying the probable skill deficits and possible environmental factors which need to be considered in cases of reading difficulty. However, the enriched perspective that may result from the understanding of learner factors such as visual-auditory integration abilities, may help us to understand the more difficult cases of reading difficulties where individuals were unable to criginally develop particular skills or could not take advantage of subsequent concentrated instructional activities aimed at teaching these skills. Many factors, such as brain growth and specific functions, appear to develop in a non-linear fashion. Because of these inconsistent developmental patterns, we will need to diagnose and monitor the progress of these individuals in terms of their evolving capabilities as they are associated with the particular demands of the learning tasks.

Figure 1



Taken from The Scientific American, pg. 190, September, 1979.

Figure 2



Taken from The Scientific American, pg. 190, September, 1979

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