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A Research Review of Literature on Learning Modalities

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[A Research Review of Literature on Learning Modalities]

Master's Thesis

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A Research Review of Literature on Learning Modalities

Chapter 1

Introduction

When Helen Keller realized that w-a-t-e-r spelled on her hand symbolized the cool liquid she knew, she didn't learn only one word, she was enabled to unlock the world of all knowledge. Anyone who saw "The Miracle Worker" thrilled to that moment of revelation. Because of the long period of frustration and the seemingly insurmountable barriers the dramatic breakthrough into use of words came as a miracle. No less miraculous is each child's acquisition of the same concept, but because it occurs informally, naturally, when it is expected in the child's development, it may pass unnoticed except by doting parents. (Niensted, 1970, p. 2)

No less miraculous is each child's extension of the same concept in learning to read. The development of reading ability, however, does not usually occur informally or naturally but rather is the product of formalized instruction by trained teachers. Unfortunately no one has ever been able to "teach the teachers" any one sure-fire method of reading instruction. Perhaps the complex nature of the reading process is best reflected in the number of methods that have been developed to facilitate reading instruction.

For decades the concept of learning modalities has been with us. It has been hypothesized that children have differing strengths and weaknesses relating to their method of information intake. It is thought, for example, that where one child

seems adept at learning the visually presented word another child might be equally adept at learning the aurally presented word but rather weak when confronted with the visual presentation. Preferred learning modalities are usually thought of as being visual, auditory or kinesthetic. Put another way, this concept further developed by Usgood (1957), Wepman (1960), Kirk and McCarthy (1961) simply implies that learners have propensities for dealing with information in one of the aforementioned primary senses.

If it is really true that some individuals are visual, auditory or kinesthetic learners then why couldn't reading instruction take advantage of this fact? Wouldn't it be possible to obtain knowledge of a child's preferred learning modality and then use this information to teach him reading? It might then also be hypothesized that reading is a process of inter-modal matching -- the matching of spoken or heard (auditory) information with written (visual) information. In extending this view even further, Jester and Travers (1966) hypothesized that

the printed symbols which are used to convey messages in written form are actually representations of the auditory form of the message. That is to say, when someone wishes to convey information in printed form, the printed symbols represent the words which the encoder mentally pronounces or employs in shaping the message. The decoder appears to transform the printed symbols back into the same mental pronunciations of speech which the encoder employed. Reading, then does not negate the need for the spoken form of the message. Rather, it is an additional step which

provides certain advantages over oral communication (p. 8).

The above discussion is, of course, an oversimplified explanation of an extremely complex issue. It is in laboratory studies of perception where the modality concept has its roots. Such terms as discrimination, differentiation, intersensory transfer, intersensory perceptual shifting, and modal preference were used first by perceptual psychologists and then more recently by classroom teachers.

Historical Sketch of Modality Research between 1886 and the Present

The concept of modality has been with us since 1886 (a Charcot hypothesis) although it was not until the late 1950's that it actually became actively debated. This is not to say that research in the intervening years ground to a halt. Several experiments were completed between 1886 and 1955. However, the purpose of most of these studies was the comparison of verbal and printed materials or the learning of lists of words or nonsense syllables by groups.

In these studies, the factor of individual differences has been seen less as a point for research than as an annoying variable accounting for many of the conflicting findings of modality research. Consequently, only a few studies have made an effort to determine the role of individual modal preferences in learning and fewer still have been concerned with learning to read (Jones, 1970, p. 2).

Results obtained from many of these studies were, as mentioned before, extremely contradictory. For example, Gates (1916) and Koch (1930) completed experiments which led them to

conclude that visual presentation of verbal materials are superior to auditory. In 1912, however, Henmon found that the auditory presentation was more effective. Other experiments (for example, Smedley, 1902) found that the combination of audio and visual stimulation was superior in some cases to either one whatever the subject's preference may be. On the other hand, Moore (1919) completed an experiment in which he found that subjects tended to recall factual material more accurately when they heard it spoken rather than when they had a manuscript to read which followed the spoken material exactly. To confuse the issue even further, Barlow (1928) found that when "kinesthetic stimulation in the form of movements of articulation is added to visual stimulation, to auditory, or to the two combined, the most frequent result has been an increase in rate of learning" (McGeoch and Irion, 1952, p. 481).

For a more complete review of modality research completed prior to the late 1950's one of the following sources could be consulted: Day and Beach (1950), McGeoch and Irion (1952), Witty and Sizemore (1958, 1959a, 1959b), and Jones (1970).

As has been stated before, the late 1950's brought a re-activation of the whole modality controversy. Research completed between this time and the present provided most of the material for this paper.

In order to bring this historical sketch "up to date", mention of the publication of the first chapter on learning dis-

orders in the Review of Educational Research (Bateman, 1966) should not be neglected. Largely as a result of this publication three task forces were commissioned by units of the U. S. Office of Education, National Society for Crippled Children and Adults, and the U. S. Public Health Service. The purpose of these task forces was to study the status and needs of children with learning disabilities. Emphasis was placed on individualizing instruction to meet the differing needs of these special children and of course the issue of adapting instructional programs to the individual modality preference of each child was raised. Much research was generated in search of answers to the problems raised in the task of justifying, developing and instituting programs having strong modality bases. An examination of Coordinating Reading Instruction (Robinson, 1971) reveals sixteen entries related to auditory functioning, thirteen describing the visile child and twenty three additional modality entries. "This small book describes the rationale for the new Scott Foresman basal reading programs, whose Dick and Jane books have dominated reading materials for all children for the past 30 years" (Waugh, 1971, p. 8).

In summary, then, psychologists and educators have discussed differences in modality preferences and have speculated about the possibility of relating this preference to instructional procedures since the late 1800's. "The past decade has seen development of formal organizations as well as a tremendous in-

crease in the publication of journal articles, evaluation instruments and instructional programs designed in part to identify and capitalize upon individual modality preference" (Waugh, 1971, p. 8). Much of this effort has come from persons interested in the education of exceptional children especially those children who are normal in mental ability, sensory acuity and emotional stability but who receive and process sensory data in some idiosyncratic manner.

Chapter 2

Articles and Studies in Support of Modality Theory

At the center of the whole modal controversy lies the unresolved issue of preferred mode. Is it indeed possible for a learner to prefer his sense of sight, for example, when attempting to take in and process information? Do some learners in fact rely much more heavily upon one sensory modality or perhaps a definite combination of modalities for their information intake? Those researchers which support and strongly advocate the practicality of modality theory as applied to education answer with a resounding -- Yes. Joseph Wepman, for example, who is a prominent figure in the field of modality research, subscribed wholeheartedly to the idea of preferential modality when he said, "The child as he develops appears to use one modality in preference to others in his learning. For most children (and for most adults) this means that while all modalities are available to process

sensory data, one modality -- auditory, visual or haptic is dominant" (Wepman, 1971, p. 5).

Edward Dechant perhaps put it best when he said,

In addition to an understanding of the pupil's maturational, experiential, intellectual, neural, physical, social, emotional, motivational, language, and sensory characteristics, knowing the pupil means knowing his preferred mode of learning. Identification of the child's mode of learning may well be the end goal of classroom diagnosis...It would seem reasonable to utilize instructional materials with each learner's particular strengths in perception, imagery, and recall (Dechant, 1967, p. 23).

It therefore follows that educators would indeed be making a mistake if they treated all children as though they could learn equally well through the same modality. "It seems more important for us to know how a child learns than to know how much he has learned" (Wepman, 1971, p. 9).

It has further been postulated by some investigators that not everyone shows the same degree of modality preference. Some learners, those usually described as the most inefficient, depend much more heavily upon one sensory modality than another. For example, Cooper (1969) adapted the procedure from the Mills Learning Methods Test (see Appendix A) to use with nonsense syllables in studying the learning modalities of good and poor first grade readers. He concluded that modality preference seemed to be more important for poor readers than for good readers. Cullinan concurred when she said, "Clinical evidence indicates that children with learning problems have greater facility in using one modality than another" (Cullinan, 1969, p. 1). As

this theory is applied to reading, sensory integration holds the key to success. Some researchers claim that for the large majority of children, proficiency in visual and auditory perception, especially, and the integration of these two modalities with others are essential to achievement in reading.

One example of a study which further illustrates this point is "Relation of Auditory-Visual Shifting to Reading Achievement" by Katz and Deutsch (1963). They theorized that one perceptual skill which may underlie reading behavior is the ability to process sequentially presented auditory and visual information. Their study investigated the hypothesis that retarded and potentially retarded readers would exhibit difficulty in rapidly shifting attention between auditory and visual stimuli. Possible age differences in this behavior were also examined. Reaction times to a series of lights and sounds were obtained from normal and retarded readers at three grade levels. The findings indicated that at all ages poor and good readers differed significantly in the ease with which attention was shifted from one modality to another. The finding that modality shifting differences can be related to potential as well as actual reading achievement tends to support the notion that this particular perceptual skill is basic to reading performance.

To complicate the preferred modality issue still further, Linder and Fillmer (1971) suggest that not only may a learner show a definite modality preference and experience difficulty

in shifting between modalities, but that

within each sense there is a hierarchy of meaningfulness which demands increasingly greater proficiency. This hierarchy moves from concrete to representational to abstraction of the information. An example of the progression of such an hierarchy would be to present the child first with a ball to examine (concrete). On the next level a picture of a ball would be presented (representational). Finally, the word ball would be used (abstract). The difficulty of cognition varies among modalities, however, An abstract visual portrayal or a diagram in the representational stage may not be so difficult to learn as an abstract auditory explanation of the same complex system. Senses, however, act in cooperation much more frequently than they act independently (p. 6).

Of this ability to integrate the modalities, Strang (1968) states: "To grasp the meaning of an unfamiliar word, unskilled or beginning readers need to say it or form the spoken word with their lips. Even fluent readers may evoke auditory and motor images of which they are scarcely aware and may resort to obvious vocalization when they meet an unfamiliar word" (p. 132).

It is the next logical step to question the means through which individual modality preference is acquired. Why could one person, for example, develop into an auditory learner while another becomes more dependent on the visual modality? Is it innate ability, experience or habit patterns which constitute the determiner of modal preference?

Katz (1967) states that the whole question of what determines modal preference is by nature circular.

For example, innate ability allows one to make the most use of experience, which, in turn, is probably a deciding factor in the establishment of habit patterns. If one follows a pattern, experience with a particular mode is

strengthened, again within the bounds of ability. Habit patterns cannot be established without experience, experience cannot be gained without ability, and ability cannot be measured except through signs of performance, i.e. experience (p. 229).

Even Katz, however, admits to the one possible factor which could be the crucial determiner of modal preference -- sensory defect. If a person could not see well he would therefore necessarily have to be more dependent on listening than a normally sighted person. The opposite, obviously would follow in the case of a hearing defect.

There has been much evidence to support the "preferred mode" idea. Day and Beach (1950), McGeoch and Irion (1952), Witty and Sizemore (1958) and Balmuth (1969) indicate that the auditory mode seems to be the preferred mode in younger children for the learning of verbal material. In 1971 Ronald Linder and Harry T. Fillmer published a paper, the subject of which ties in closely with this very idea. They concluded that,

young elementary children are usually auditory learners. At approximately grade 6 they tend to change from auditory to visual learners as their reading skills improve to the point where they can read more proficiently than they can hear. In dealing with the printed word, illiterate adults are usually auditory learners undoubtedly because of their reading disabilities. For most adults, complex information is learned more efficiently through a visual presentation because printed material is more accessible for review. Easy material is learned more efficiently through an auditory presentation because there is usually little need for review (p. 3).

Linder and Fillmer further concluded that research on the effects of visual and auditory presentation of information and on early sensory experience indicated that:

1. Children of different cultural and social backgrounds show different preferences for auditory and visual presentation.
2. Preference for visual and auditory presentation changes with maturational level.
3. The appropriate modality of presentation is determined by the type, complexity, and extensiveness of the information to be conveyed.
4. Types of sensory modalities exist in a hierarchy moving from concrete meaning to abstract meaning.
5. Feedback stimulates learning.
6. Auditory deficits are more common than visual deficits.
7. Children of low socioeconomic levels have deficits in all language development. (p. 1)

In a study on "Visual and Aural Learning in Urban Children" by Joanna Williams (1970), a total of 320 subjects in five grades (two, four, six, eight, and ten) and from two types of school settings (middle class and disadvantaged) were studied. One of the main purposes of this study was to examine the relative efficiency of visual and aural learning over a range of grade levels much wider than that covered in previous experiments. Subjects learned eight-pair lists of familiar nouns in a standard paired-associates task. Each subject learned two lists, one presented visually and the other, aurally. Results indicated that performance on the visual task was superior to that on the aural task and subjects in higher grades performed better than those in lower grades.

"Paired associates learning has been investigated in several

studies because it is closely related to many of the tasks that children must perform in the school setting. For example, recent analyses of the processes involved in reading have stressed the development of grapheme-phoneme relationships" (p. 3). This ties in very closely with the modal approach in the stressing of visual-aural modes.

Thomas R. Vandever (1971) completed one of the most recent studies on grapheme-phoneme relationships. In this study the high phoneme-grapheme consistency words (High PGC) referred to those words which both sounded and looked alike and the Low PGC words referred to the opposite condition. For the purpose of this research, cue emphasis (CE) referred to cues stressed in teaching the decoding skills. For example, visual CE would involve the maximization of visual cues like word length, configuration and distinctive letters. Auditory CE involved the maximization of auditory cues such as letter sounds. Kinesthetic CE involved the utilization of proprioceptive cues. The purposes of his study were to assess the effect of phoneme-grapheme consistency (PGC) and cue emphasis (CE) on the development of decoding skills in first graders and to determine the relationship of consistency of original lists to the recognition of new words. Subjects were 162 first graders, mean age 6.11 years and scoring above 30 on the Metropolitan Readiness Test, randomly assigned to 18 treatment groups. Original word lists and recognition new word lists were developed for both High PGC and low PGC words.

Subjects learned one list of eight words on each of three consecutive days. While all subjects learned words with all the CE methods, half the groups learned consistent words, and the other half learned inconsistent words. At the end of the last session, all subjects were given the recognition new word lists to assess their ability to decode these words. It was found that: 1. there were no differences in the number of words recognized by High and Low-PGC groups for the first two days, but by the third day the high PGC groups recognized more words; 2. subjects recognized more auditory CE words than visual or kinesthetic CE words; and 3. PGC of original lists did not affect the number of words recognized.

The fact that auditory cue emphasis facilitated decoding may indicate (once again) that auditory cues should be stressed when presenting words to beginning readers. Samuels and Jeffrey (1967) found that training which requires the subjects to pay attention to each letter was more likely to result in fewer subsequent reading errors than training based on word-identification through a single cue. Auditory CE provided just such cues. In other words auditory CE may be the most effective because it encourages the child to attend to letter-sound relationships. The ineffectiveness of visual CE and kinesthetic CE may mitigate against the use of these methods with beginning readers.

Another major thrust of the modality controversy extends the idea of preferred mode into what is commonly referred to as

the cue summation theory. This theory predicts that discriminative learning is increased as additional cues or stimuli are presented. This is the same type of logic which supports the old "two heads are better than one" proverb. Some researchers claim that the addition of auditory cues to visual cues provides a potentially superior sensory intake channel than either audio or visual cues taken singly. Other researchers take the position that deliberate sensory multi-channel projection of material to be learned merely confuses the subject and causes interference.

In one research project, Jester and Travers (1966) observed that:

some subjects tended to cover their ears or eyes during the high speed modality presentation. Following the experimental sessions subjects were asked their reactions to receiving information at such high speeds. Most of the subjects expressed the opinion that it was confusing and that they had to pay particular attention in order to comprehend the material. In addition, subjects in the audio-visual group reported that they had to exert particular effort to "block" one channel so that the other could be used and understood (p. 301).

These observations would again indicate that there is no advantage to supplying even totally redundant information through more than one sensory modality and thus flooding the learner with more than he can handle. Put another way, "too much detail reduces learning efficiency, whether it is caused by an overabundance of presentations, too much clutter in pictures and photographs or a learning environment that is so rich with information that it is confusing to the pupil" (Jester et al., 1966, p. 301).

While granting the hypothetical superiority of a multi-mode learning channel it is possible to account for its superiority in a controversial way. Jester et al. (1966) observe, for example, that:

the superiority of the audio-visual mode of presentation could easily be accounted for by individual differences in capability to handle one or the other mode of presentation. Assuming that some people are better able to comprehend material by one or the other modality, then it is quite likely that the individual's preferred mode of receiving information would be used in the audio-visual presentation. This would permit many to do better when they had such a choice than when no choice of sense modality were available (p. 301).

As stated before there is a sizeable body of research which does not support these views. Educational television along with many other audio-visual aids, subscribes to the superiority of audio-visual in combination, over either audio, or visual taken singly:

Although there are rare occasions when television will present either pictures or sounds, one without the other, its special capacity is in their coordinated combination. For instance, in a segment designed to teach letter discrimination, Big Bird, an eight-foot tall feathered puppet who tends to be confused easily, is shown painstakingly drawing an E and an F side-by-side on a blackboard. Viewing children attend to Big Bird's efforts until the letters are completed (they are alert to Big Bird's tendency to make mistakes, which they enjoy correcting); then their interest fades. Soon, however, while Big Bird watches in befuddlement, the bottom line of the E migrates mysteriously to the neighboring F, making an E of the F and an F of the original E. As the bottom line of the E begins its magical move, a slide-whistle sound accompanies its jerky progress.

In this example, the principle of synchronizing sight and sound to provide cross-modal reinforcement instead of interference is clear. Carrying the principle into actual writing and production required that we learn how one modality can

be used to support another, instead of cancelling out or interfering with the other. Since most existing research asks how the different modalities compare when considered singly, much remains to be learned. (Lesser, 1972, p. 243)

Modality Concepts As Applied to the Classroom

If the implications of the many modality articles and studies already mentioned have not already become obvious to the reader these questions may begin to arise: Why include studies which are so closely concerned with the idea of modality preference? Isn't it rather pointless to spend so much time and space talking about a topic which is so far removed from the everyday practicalities of reading instruction in our schools?

Practically speaking, the answer to the last question above is no! The concept of preferential modalities is absolutely necessary to application of modality techniques in the classroom. This is because preferred modality implies the ability to separate modalities in order to arrive at the preferred one. Further, it is this very separation of the different perceptual modes which makes it possible to empirically work with and test them. If, for example, it is true that the basic modality concept is in fact correct but so complex in nature as to preclude any fractioning into smaller empirically testable units then there is no way to apply the concept to the learner and reading process. Thus the idea of smaller units in preferred modalities is crucial to the application of modality techniques and the larger

concept to reading. The studies discussed present a fairly wide view of different approaches and findings on this topic. The very fact that these studies did not always agree in their findings suggest the need for further research.

Results of the particular modality preference studies already mentioned suggests that educational programs should be developed to suit the modality preference of the individual child.

Clinically, children show marked differences in their capacities as well as their interests along dominant modality lines. There is the child who can't remember what the teacher told him to do, but who remembers with ease the lesson plan written on the blackboard, and the child who is said to be recalcitrant and stubborn even perhaps deaf because he keeps repeating "what" to everything said to him - when you know he's not suffering from a hearing loss. But most dramatically there is the child who just can't learn phonics no matter how hard the teacher tries to teach him but increases in his ability to pick out meaningful words from the printed page.

A 1956 study by Robert Mills showed that different children do indeed learn to recognize words more efficiently by different teaching methods and that no one method is best for all children. From his study of 58 pupils in grades two through four, some conclusions about the effectiveness of specific teaching methods were drawn for certain types of children.

1. Children of low intelligence - The phonic method is least effective for this group. The kinesthetic method

is best in the greatest number of cases, but it is not statistically better than the visual and the combination methods.

2. Children of average intelligence - For the majority of cases in this group the kinesthetic method is the least effective. The phonic method showed no statistical significance in either direction. The combination and the visual methods proved to be about equally good for this group of average intelligence.
3. Children of high intelligence - In this group the authors were restricted in any conclusions they could draw about the relative effectiveness of methods because all subjects tended to learn words readily regardless of the teaching method used. However, the visual method did prove superior to the kinesthetic method for this group.
4. Seven year olds - The visual method appeared to be best and the kinesthetic method appeared to be the poorest. The other two methods seemed to be neither consistently effective nor ineffective in working with this group.
5. Eight year olds - The kinesthetic method proved to be best for this age group. It was significantly better than the phonic and somewhat better than the other two. (This finding may have some possible relation to the fact that eight year olds are usually just becoming proficient in handwriting and show a great deal of interest in related activities.)
6. Nine year olds - No one of the four methods (visual, auditory, kinesthetic or combination) was outstandingly effective or ineffective. The visual method did tend to be better than the kinesthetic method for this group of older children. (p. 224)

In general, this study shows that the higher the intelligence, the more readily children learn words. However, there is no consistent relationship between age and a child's readiness to learn words for the three age groups studied. This finding, of course, has implications for present school practices where chronological age still is all too often used as the major criterion in deciding when a child is ready to learn words. (p. 225)

Although it is a simple matter to suggest that an auditory approach to reading should be followed with one child and a visual or kinesthetic-tactile approach would prove more beneficial to another child, putting such ideas into actual practice may not be accomplished so easily.

In a study on word learning modes and word recognition, Lumpkin (1971) suggests that, "learning activities and procedures can be devised which incorporate saying the word or writing the word, or tracing the word. Directions for games can include requirements for pointing out correct responses, for placing matching cards in proper juxtaposition, for getting body movement into the learning setting when pupils respond positively to an approach of this nature" (p. 9).

One plan developed along these lines by Ringler, Smith and Cullinan (1971) for use in a research study gives some concrete examples of different sensory approach possibilities:

For the auditory approach, tapes were prepared so that subjects could listen to the sound of the whole word in isolation, in context, and to the specific initial, medial or final sounds in the word. For the visual approach, transparencies were prepared for use with the overhead projector. Each of these transparencies emphasized the configuration (size and shape) of the 50 words. Materials prepared for the kinesthetic approach included word cards on which 50 words were outlined in pipe cleaners for a 3-dimensional effect and tactile emphasis (p. 5).

Perhaps the most commonly acknowledged, practically applied modal approach to the teaching of reading is the VAKT (Visual-Auditory-Kinesthetic-Tactile) method. This method was originally designed by Grace Fernald and provides multimedia exposure through

sight, hearing and touching. Although the Visual-Auditory part of the method should be obvious, perhaps the Kinesthetic-Tactile part could merit a further explanation. As used in this context, Kinesthetic-Tactile denotes the sense that yields knowledge of movement in terms of lip and throat movements in recalling sounds as well as in terms of finger-hand movement in recalling and tracing the word.

One example of how the VAKT method operates is given in the following spelling instruction sequence. Six steps to be followed in using the VAKT method are:

1. inspect the whole word to be learned.
2. pronounce or enunciate the whole word.
3. write the whole word while pronouncing each syllable.
4. dot the "i's" and cross the "t's" in the left to right sequence.
5. pronounce each syllable and underline it and
6. pronounce the whole word again.

This method teaches students to spell and read and provides an approach to the independent acquisition of new words (Taschow, 1970, p. 9).

Another investigator, Sivan E. Caukins (1971) stated recently:

The need is now to develop more appropriate methods so that our children can be successful. These courses must be based on the most effective utilization of motor patterns, proprioceptor stimulation or the involvement of the muscle spindles in the learning process, rather than on a visual-auditory basis. One such method was developed as a remedial approach to reading problems (Fernald Method VAKT). The method strongly uses and stimulates the muscle sense while

conditioning all the other senses to a basic motor pattern. Each sense becomes married to the other (p. 17).

According to Jones (1971), the Fernald Technique has been shown to be quite successful in teaching retarded readers. Children who learn to read through this approach after conventional methods have failed may not necessarily prefer the kinesthetic or tactile mode to the visual and/or auditory modes.

Ofman and Shaevitz (1963) argued convincingly from their research findings that the important variable in the Fernald Technique is the forced visual attention required in tracing and not the kinesthetic and tactile cues.

The VAKT method, however, does not presume to predict where the visual mode, for example, leaves off and the aural begins. It recognizes the potential difficulty in determining modal preference and the complexities of intermodal matching. However, it does attempt to provide a practical, workable approach to the use of the modality concept.

Another type of modal approach similar to the Fernald Technique has been devised by Harold and Harriet Blau (1968). "The basic theory involved is that, in some cases, learning, and especially learning to read may be literally cut off or short-circuited by the visual modality rather than merely obstructed" (p. 126). Therefore, the visual modality should be blindfolded or cut-off and the learner could then more effectively make use of his remaining sensory channels.

This criticism of the visual modality approach takes almost

the exact opposite position from Ofman and Shaevitz. Where Ofman et al. argue that it is the use of the visual modality alone which accounts for the VAKT method's success, Harold and Harriet Blau take the position that use of the visual modality in the VAKT method accounts for that method's weakest part.

Perhaps the Blau AKT theory could best be illustrated by describing the individual case of Jay. Jay was a fourth grade student of normal intelligence but with serious difficulties in visual perception, behavior, and to a degree in the motor area and perhaps with a possibility of brain damage. He scored on the five-year-old level on the Frostig Test of Visual Perception.

As late as May he was still confusing say for saw, who for how, etc/ and when confronted with the word my in a "Grab" game, remarked that he had never seen that word before. He managed, in early June, to score 2.4 on an alternate form of the Gates but his spelling skills continued non-existent. Asked about them, his teacher of that year remarked succinctly, "Yes, he could spell - t h e" (p. 128).

In October of 1966 Jay began to be experimentally taught by the Non-Visual method. In the following list the words spelled correctly were taught by the AKT or Non-Visual method and those spelled incorrectly by regular classroom techniques.

- | | |
|--------------------|------------------------|
| 1. one | 6. bottom |
| 2. anyone | 7. prought (president) |
| 3. mong (mountain) | 8. insahtam (instead) |
| 4. excuse | 9. sonsw (straight) |
| 5. ink | 10. horn |

Jay continued to gain and by December of 1967, a fifth grader, he read many more books than were required by class assignment (mostly on the fourth grade level) and was doing very well with his spelling.

"Others with whom the technique has been used since October 1966 have benefited in various ways. One student over forty, has gone from a third grade level to a level of 'normal' adult competence"(p. 129).

Another approach to modality is the task-learner approach described by Norman Buktenica (1970). Mr. Buktenica said that, "a task-learner characteristic model is an attempt to generate a best-fit blend in instruction; that is, the learner and his characteristics are blended in the most appropriate way with the task that he is to learn" (p. 1). Thus, early screening and matching of the learning ability of children with instructional programs holds promise to diminish school learning problems. Perhaps this is not really "another approach" but the same approach everyone has been trying to work toward.

In an approach by Sivan Caukins (1970) a proprioceptor stimulation or multi-sensory approach of teaching was proposed. It was maintained that kinesthetic methods are more appropriate for teaching boys than the visual-auditory approach used for both boys and girls now. By presenting data from various studies which indicated that the larger numbers of juvenile delinquents and retarded readers in elementary grades are boys, the author

argued that boys are being feminized by our current educational system.

Even though there has been a wide range of possible modal approaches mentioned in this section of the paper there are certain educational suggestions which might be concluded. Most of these were initially formulated by Wepman (1971) as he concluded his paper on the background and research of the modality concept:

1. It is important to know the modality preference of young children. The knowledge should help one plan an educational program in keeping with this preference, especially if the preference is strong and the modalities are widely unbalanced.
2. A child's learning potential could be maximized by the provision of sufficient clues in the preferred modality for his easy use and identification. At the same time the teacher should use the lesser non-preferred pathways for constant support and reinforcement.
3. Children who are bright usually adapt to perceptual faults by themselves, but when they fail to adapt naturally, modality-bound instruction should be brought to early attention.
4. For children having difficulty learning to read, all else being adequate and normal, attacking their remedial problem via their best modality should maximize their chances.
5. There is the danger of confusing slower developing individual modalities with perceptual handicaps, mental retardation or other pathological states. This should be constantly guarded against.

Slow development of a specific modality is a natural process in some children. Where the lag is severe and not developing as it should or when the child is over nine, attempts to compensate and offset the undeveloped modality should be tried.

6. Teachers should help pupils use all of the sensory modalities in learning. Pupils should have the opportunity to experiment with films with and without sound tracks, respond to taste, touch and smell as well as sound and appearance.

Articles and Studies Which Cast Doubt Upon the Practical
Application of Modality Concepts in the Classroom

In 1971, John P. Jones reviewed seven research studies which attempted to determine the role of individual modal preference as related to learning to read. The seven studies were by Bate-man (1968); Robinson (1968); Jones (1970); Bruininks (1968); Cripe (1966); DeHirsh, Jansky, and Langford (1966); and Bursuk (1971). All seven studies concentrated on studying visual and auditory modalities. Of these studies the author stated that only Bursuk firmly supported the theory that the modal preference of an individual should be considered in teaching him to read. Jones concluded that it would be extremely difficult to find an approach for teaching which would eliminate almost entirely the role of either the visual or auditory mode. A second problem he mentioned is the proper identification of modal preference. At least four of the studies he reviewed revealed weaknesses in

terms of the identification of modal preference. As of 1971 Jones stated that no test had yet been devised which was sufficiently reliable to accurately identify a subject's preferred mode.

Jones, more than anyone else, perhaps, typifies the growing number of investigators who are skeptical not only of past research efforts in the field of modality study, but of the potential practicality of putting modality theory into direct classroom practice.

The following studies reviewed here resulted in findings which do not support the preferred mode idea in group study. In general, these studies concluded that no sweeping non-specific statements could be made about preferred modes when referring to groups of learners. Rather, the preferred mode would be highly individual and even then, difficult to ascertain.

The first of these was by Bernice Cullinan (1969). She did an exploratory study to discover the relationships between preferred learning modalities and differentiated presentation of reading tasks. Subjects were given the New York University Modality Test (see Appendix A) which indicated their preferred modality (auditory, visual, or kinesthetic). The subjects were then randomly assigned within each modality to one of four experimental groups or a control group. All subjects received the regular program of first grade instruction. However, the treatments differed in the type of emphasis and materials used in the presentation of reading tasks according to the modality emphasized.

Among the results obtained from the word recognition test was that each of the four treatment groups differed significantly from the control group but not significantly from each other, indicating no preferred modality for first graders in general. However, according to the Metropolitan Reading Test the treatment groups did not differ significantly either from each other or from the control group on total reading score or on the word discrimination subtest. This result could have been affected by the use of standardized reading achievement tests with inner-city children that had been normed on a national sample.

"A Study of the Learning Modalities of Good and Poor First Grade Readers" by David J. Cooper (1970) is also related to the question of preferential modalities. In this study a sample of fifteen good and fifteen poor first grade readers were individually taught five nonsense syllables by each of four teaching modalities procedures: visual, auditory, kinesthetic, and a combination of the three. The teaching procedure was based on the Mills Learning Methods Test and was carried out by the researcher in a laboratory situation. Twenty-four hours later a test of retention was given. As expected, good readers took significantly fewer trials to master nonsense syllables and retained more nonsense syllables than the poor readers did. However, no single mode of learning resulted in significantly superior acquisition of retention of nonsense syllables for either good or poor readers as a group. Rather modality preference seemed to be an individual

matter. However, variation in acquisition and retention scores between modalities were greater for poor readers than for good readers.

A third example of related research was done by Jones and Aaron (1971). The purpose of this study was to determine if significant relationships exist among inter-sensory transfer ability, modal preference, and reading achievement. Ninety third-graders were given experimenter devised tests to measure inter-sensory transfer, intersensory perceptual reaction time, modal preference, and sight vocabulary. In addition, subjects were given the reading subtest of the Metropolitan Achievement Tests, and the Lorge-Thorndike Intelligence Test. Positive correlations were found between sight vocabulary and reading comprehension, between intersensory transfer and intelligence in addition to the expected high relationships among sight vocabulary, reading comprehension and I.Q. It was concluded that: (1) auditory-visual integration is related to reading achievement in grade three (2) ability to respond rapidly to cross-modal stimulus presentation is related to the sight vocabulary aspect of reading achievement and (3) direction of modal preference has no effect on intersensory tests used in determining modal preference. This then corroborated the research of Cooper and Cullinan, at least in some aspects.

Several fairly recent investigations have failed to substantiate hypotheses in support of the preferred modality concept.

These results could be interpreted in two ways. In one view these results may indicate that barring physical defects (which might negate the use of a given modality) there is really no such thing as modality preference. Rather, it could be suggested that learners utilize a complex inter-meshing of perceptions in the gathering of verbal information. These perceptions are perhaps so intricately inter-dependent that they do not merit the more general term of modalities. The second interpretation could view the same results as simply being indicative of the fact that research has not yet found a way of accurately assessing modality preference. If subjects could not be accurately placed in modality preference groups then the research results would mean very little.

Robert H. Bruininks (1968) did a study on the "Relationship of Auditory and Visual Perceptual Strengths to Methods of Teaching Word Recognition Among Disadvantaged Negro Boys". The main purpose of his study was to assess whether matching teaching methods to the auditory and visual perceptual strengths of second and third grade disadvantaged children would facilitate the learning of unknown words. A secondary objective sought to evaluate the relationship between a number of auditory and visual perception tests and a measure of reading achievement. It was predicted that the use of such teaching would facilitate learning to recognize unknown words. Subjects were divided into perceptual dominance groups and attempts were made to teach each subject the recognition of fifteen words by the "look-say" approach,

and fifteen by the phonic method. The comparisons involving the differences between perceptual dominance groups, methods of teaching, and order of teaching presentation failed to reach statistical significance. The conclusion was that disadvantaged Negro boys learned to recognize unknown words equally well under teaching procedures which matched either their perceptual strengths or weaknesses; and also that there was no relation between low perceptual test scores and reading performance. Failure to obtain an interaction between perceptual dominance and teaching approaches was consistent with the results of previous studies by Bateman (1967), Harris (1965), and Robinson (1968). Thus, the existing evidence seems to indicate that teaching to perceptual strengths or weaknesses of learners has little or no effect on the development of word recognition skills.

Marjorie Rowe Heyman (1970) did an interesting research study on "Testing Word Recognition As a Function of Learning Modality". In this study, training in word recognition based on a child's dominant sensory modality (visual, auditory, or kinesthetic) was compared with training based on non-dominant modality. Subjects (first grade children with no prior reading instruction) were divided into perceptual dominance groups and then exposed to three one week experimental training periods - one for each modality. Each period included tests of immediate and delayed recall of words taught. Results indicated that modality preference did not have an effect and the performance of subjects

in the various modalities did not reach a statistically significant difference.

A more recent study by Ruth Waugh (1971) showed similar results. In this study one hundred and sixty-six second graders were administered the Illinois Test of Psycholinguistic Abilities (ITPA), and a visual and auditory memory test. Intra-individual discrepancies between a child's performance on comparable visual and auditory measures served to identify him as a visual or an auditory learner. Significantly more five year old children exhibited a visual modality preference; at seven years of age, the reverse was true. All children responded to four instructional procedures, two of which elicited simple visual and auditory recall, while the other two elicited more complex procedures in word recognition. When auditory subjects were compared to the visual subjects on performance, it was found that the former did significantly better than the latter on both visual and auditory recall tasks. No differences were noted on the more complex tasks. Longitudinal data of the ITPA were available for 39 of the subjects, and stability coefficients for the six months and a twenty-six month period were computed for each sub test. Coefficients for the six months period are low and suggest that planning long term instructional programs around modality preference would be hazardous. (Using a moderately stringent classification of modality preference no child in the sample of 39 maintained a single modality preference over a two year period).

The premise that certain children have a preferred modality which facilitates recall and recognition of words is certainly not supported by the data evidenced in this study. None of the sixteen comparisons studied in this research led to support for the proposition that instruction can be profitably matched to the modality preference of the child. Theoretical formulations which propose this idea are, however, popular.

"The author concludes that the results of this study are congruent with other published investigations of the interaction between perceptual preference and instructional procedures. In general, the contention that interaction does occur is based on fantasy rather than fact" (Waugh, 1971, p. 7).

As the results of studies presented in this section should now have made obvious, perhaps the major problem in modality research to this date has been in the lack of valid and reliable testing instruments. Children, as yet, cannot be reliably separated on the basis of relative auditory or visual modality strength. Reliability data for some of the instruments currently used remains unpublished. Published research reports attempting to verify assumptions based on existing test instruments have for the most part failed to support an interaction between instructional method and modality preference. As a result many investigators, like those mentioned in this section of the paper, do not support the introduction of modality based instructional programs in the classroom. "Clearly, additional information is needed

before educators can proceed with confidence in the purchase and use of tests and materials designed to accelerate academic performance through adaptation of the instructional program to the modality preference of the child." (Waugh, 1971, p. 10)

Finding an approach for teaching visual decoding skills which eliminates almost entirely the role of either the visual or auditory mode is extremely difficult. "Certainly none of the existing basal programs on the market can be labelled either as visual or auditory, though some may be said to stress the auditory mode or the visual mode more than others" (Jones, 1971, p. 8).

Chapter 3

Modality Articles and Studies in the '1970's

The following five studies were all published sometime within the last four years. Results of three of these studies for the most part support the educational practicality of modality theory, one study obtained inconclusive results and the remaining study failed to support the educational practicality of modality theory. This division of research opinion presented here with the larger percentage in the "support applied modality theory camp" is not meant to reflect the main body of research completed in the years 1970 - 1974. Little can be concluded on major modality research trends in the last four years because so much of the evidence either remains incomplete, unpublished or otherwise inaccessible

for a variety of reasons. Robert H. Bruininks and Charlotte Clark (1970) did a study on "Auditory and Visual Learning in First-, Third-, and Fifth-Grade Children". The purpose of this study was to determine the relative effectiveness of auditory, visual and combined audio-visual modes of presenting verbal material. To this end, twelve first-grade, twelve third-grade, and twelve fifth-grade children were tested on paired associates lists presented under visual, auditory and combined auditory-visual conditions. Pictures rather than printed words were used as visual stimuli to control for effects of differences in reading ability across grade levels.

Performance of all groups under visual and combined auditory-visual modes of presentation was significantly higher than that attained under the auditory condition.

The imagery inducing quality of pictures was offered as a possible explanation for superior learning under visual and auditory-visual conditions. Differences with previous findings were ascribed to poor control in other studies of the effects of reading skill in visual learning conditions.

Another study which has already been referred to in this paper was by Laura Bursuk (1971) on the "Evaluation of Correlated Listening-Reading Comprehension Lessons". The purpose of this research was to study the comparative effectiveness of correlated listening-reading and reading-only comprehension lessons. The subjects were high school retarded readers with varying sensory

modality learning preferences. Over a one-semester period, comparable lessons were taught to two groups matched for I.Q., age, reading grade level, and freedom sensory defects. The difference between the instructional treatments was one of sensory mode of lesson presentation and application - one group was taught using both aural and visual methods and the other, using a visual approach only. The groups used the same materials, were taught the same comprehension skills, and the same teacher taught both groups. Results from a standardized reading test showed that when sensory learning modality preference was not a variable, a correlated listening-reading instructional approach was more effective than a reading-only approach. Specifically, the listening-reading approach was found particularly effective for auditory learners and for students with no sensory modality preference. One conclusion was that in a group of students which is undifferentiated by learning modality preference, an aural-visual teaching approach to reading is more effective than a strictly visual approach.

According to the investigator:

Retarded readers, particularly, may lack proficiency in the visual mode of acquiring knowledge and skills, a deficit which may be an important contributing factor to their lack of progress under reading instruction programs that are unchanging in their strictly visual approach. With such pupils, it could be of benefit to use the aural avenue to introduce, clarify, and give practice in the skills of comprehension of verbal matter, before requiring them to cope with the reading of similar material (p. 3).

A third study was completed by Joel R. Levin et al. in

1973. The investigators attempted to determine whether an individual learns relatively better from pictures than from words and whether such information can be applied to the learning of prose materials. A paired-associate learning task consisting of both pictorial and verbal items from which different types of learners could be identified was developed.

The investigators further concluded, "We were able to detect reliable individual differences in children's ability to learn pictorial and verbal materials. Some children learn both well; some learn both poorly. However, for many children whether they are regarded as learners or non-learners depends on whether the materials are pictures or words" (p. 11).

In a study on "Children's Verbal Learning and Comprehension in the Aural and Visual Modes", David and Joanna Williams (1972) studied the auditory versus visual presentation of prose passages. Ninety-six fourth and sixth-graders from a predominantly white, middle class suburban area served as subjects. Major hypotheses included: 1. a mode-by-materials interaction would exist such that the paired associates would be best learned visually, the prose passages best aurally, and the sentences equally well in both modes; 2. a grade-by-mode interaction would exist such that fourth-graders would be superior in the auditory mode and sixth graders in the visual mode; and 3. an immediate measure of retention would favor the visual mode, while a delayed measure would favor the aural mode. The inconclusive results suggest

a need for further study of the precise parameters of obtained modal differences. However, support is lent to the hypothesis that prose materials are best presented aurally and that complex relationships exist between the effects of mode and length of time and materials are remembered.

The last of the modality studies in the 1970's presented here was by Ringler, Smith, and Cullinan (1971) on "Modality Preference, Differentiated Presentation of Reading Tasks and Word Recognition of First Grade Children." In this study a vocabulary list of 50 words based on children's spoken language was divided into six groups. For each group specific materials incorporating different modality presentations (pictures, tapes, transparencies, and word cards providing tactile emphasis) were developed. The modality preferences of 128 first graders were identified by the New York University Modality Test. Thirty of these subjects demonstrated an auditory preference, 33 a visual preference, 28 a kinesthetic preference, and 37 had no preference. A criterion test was developed and the pretest was administered. The children were then randomly assigned within each modality to one of four experimental groups (visual, auditory, kinesthetic, and combined) and a control group. All received the regular program of first-grade instruction, but the experimental groups received approximately 7½ hours of small group instruction using one of the four presentation methods. The post-test was given after the instruction. Statistical analysis of the results yielded the following:

1. The experimental groups made significantly greater gains than did the control group but did not differ significantly from each other.
2. There were no significant differences among the groups when the subjects were categorized by modality preference.
3. Pupils who were taught using their preferred mode did not make significantly greater gains than those pupils who received instruction through some mode other than their preferred one.

The investigators concluded that, "the results yielded no significant difference between those pupils who were taught by the method that corresponded to their modality preference and those subjects who were taught by a method that did not correspond to their modality preference" (p. 11).

In conclusion, Dorothy Lumpkin, in a 1971 paper on "Assessing Word Learning Modes and Word Recognition" stated some interesting observations which she has drawn from an intensive study of past modality research studies. Her conclusions should not go unmentioned:

A special alertness may be demanded in the decade of the seventies as reading personnel are bombarded with technological advances in different reading approaches and programs. Some of these approaches appear to have promise but often focus on one "input channel" which needs to be matched with the learner-receiver. When multiple modalities are needed for successful achievement, steps should be taken for multi-sensory exposure to new material.

The need is for more accurate measurement of word recognition competency and better identification of preferred learning mode, followed by teaching-learning procedures matched to the individual on the basis of pattern of findings. These steps are significant not only because they lead to success but because success can help to strengthen

positive self-concepts in terms of reading, and learning, and living. (p. 9)

Chapter 4

Conclusion

Although it is obvious that a great deal of learning does take place through the senses the ultimate benefit of fractioning these senses into separate modalities even if possible, could be open to question. In 1969, L. Mann noted that the concept of perception was being fractioned and that this was not a valid or useful process. It must be pointed out, however, that after Mann admonishes he tends to commit the same errors as those whom he criticized.

Research has failed to give us any clear cut evidence one way or the other. The following is just a partial list which illustrates this point more specifically:

1. Research investigating cross-modal transfer, skill and general intelligence is conflicting.
2. Research investigating the chronological stage of development when inter-sensory integration is important to success in reading is unanswered.
3. The major question of whether modal preference should be considered in the teaching of reading has not been definitely answered by research.
4. Research attempting to correlate preferred modality and intelligence is hampered by testing instruments, differences between

I.Q. tests and differences and weaknesses inherent in present modality tests.

Part of the problem is the nature of the processes with which research is attempting to deal. Perception is notorious in its refusal to become neatly sectioned into smaller empirically testable units. How does one devise a means of testing just the visual mode, for example, without interference from any of the other senses?

This problem not only helps to create procedural problems (such as devising tasks relevant to only one modality) but also affects experimental control. If investigators are having difficulty in defining their variables how can they even begin to control them?

A third difficulty arises when modality is to be studied only in relation to the reading process. How is it possible to separate visual and auditory modalities in reading? How is it possible to devise tasks that are unique only to reading and that use a single modality?

Another problem to complicate matters further is the nature of the learner himself. If there were such a thing as a "visual learner", for example, what is to prevent him from visualizing information that the experimenter is trying to present auditorially? Further, individual differences do appear to account for many of the conflicting reports of modality research. McGeoch and Irion (1952) believed these differences to be attributable to

four major variables: 1. practice - experience gained through the use of a particular mode or type of stimulation 2. chronological age - there is a necessary correlation between age and practice (through experience) 3. type of material to be learned - the mode of presentation is less important when the learning task involves meaningful discourse than when disconnected materials (such as nonsense syllables, etc.) are employed. 4. mode of apprehension - although the mode of stimulation may be manipulated the way each individual translates, the information for cognition cannot be satisfactorily controlled. Thus imagery types could be of more importance than mode of presentation.

Other factors which also serve to account for the many conflicting research results are: inadequate measuring instruments, lack of definitive instructional approaches, and limited instructional time and materials.

The following is a list of suggestions which different investigators already mentioned in this paper have offered at the conclusion of their own particular research efforts:

1. High on the list of priorities should be the development of a valid and reliable modal preference test.
2. More research should be done on the relationship between intersensory perceptual shifting and reading achievement. It could well be that the ability to effect intersensory shifts rapidly may be necessary for learning to read well but is not the prime determiner of high reading achievement.

3. There is a need for more research on the conceptual domain of reading, particularly with regard to comprehension skills.
4. Further research should be done on how our knowledge of brain functions can contribute to the development of more efficient teaching and learning methods.
5. There is a definite lack of longitudinal studies tracing the gradual development of individual intersensory transfer, intersensory perceptual shifting and modal preference.
6. Once a modal preference is identified (if such a thing is indeed possible) then materials which can be effectively used in the teaching of reading in the preferred modal area should be developed.

Perhaps the most orderly set of suggestions for further modal research was advanced by Hilgarde (1964). These included three pure research steps and three steps toward practical applications.

1. Laboratory studies not directly relevant to practical questions may be carried on with laboratory animals.
2. Controlled laboratory studies on human learning may answer basic questions about the intersensory process.
3. Research which deals with school age subjects and material learned in school must be studied in the laboratory where control may be exercised by the researcher.
4. Once generalizations have been drawn from steps 1., 2., or 3., controlled classroom experiments are required.
5. Tryout in regular settings should follow.
6. Advocacy and adoption by textbook companies and school districts should be the last step in this orderly procession

It would be possible to sketch a series of studies progressing from pure research to practical application in each of the three areas emphasized by previous modality research. Indeed, language development, cross-modal functioning and task delineation are three active current research interests.

The desire for magical cures is almost an endemic disease of educators, and may be typical of our entire culture. (Waugh, 1971, p. 37)

In summation, the relevance of modality studies to reading is not questioned. However, the idea of whether or not it is practical or useful for instructors to employ modality concepts on a widescale basis in reading instruction at this time is open to question. Until research can come up with more concrete results the practicality of employing modal concepts as a focus of reading instruction had best be postponed.

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Appendix A

Because of the fact that research opinion is almost unanimous in the conviction that current modality testing instruments are not adequate for reliable research results to be obtained from them, it was not felt necessary for the present paper to deal with the specific subject of modality tests in any great detail.

However, so that the reader has at least some idea of tests currently on the market a list is provided for the sole purpose of acquainting the reader with familiar modality test names.

Short descriptions of three of the most commonly used tests are also provided in order that the reader should have some notion of the type of material considered in these "typical" modality tests.

Descriptions of the Mills Learning Methods Test and the Gates Associative Learning Tests were written by Donovan Lumpkin as a part of his paper on Assessing Word Learning Modes and Word Recognition, 1971.

Partial List of Tests Currently Used in Modality Research

Detroit Tests of Learning Aptitude

Gates Associative Learning Tests

Illinois Test of Psycholinguistic Abilities

Inventory of Basic Learning Abilities

Marianne Frostig Developmental Test of Visual Perception

Mills Learning Methods Test

New York University Modality Test

Peabody Differential Learning Test

Purdue Perceptual Motor Survey

Van Wagenen "Word Learning" Test

Gates Associative Learning Tests.

A type of test which has been employed in identification of learning modalities is the Gates Associative Learning Tests. This set of cards, developed by Gates in 1925 and used in diagnosis provides evidence of competency in learning when only visual stimulation are available. As part of his test, Gates provided cards with visual symbols of a geometric nature requiring gross visual discrimination and association clues; other sets of cards requiring associations of a more discriminative type were composed of what Gates described as "letterlike" characters which when combined in series resemble words.

When Gates Tests are administered in conjunction with the Van Wageningen "Word Learning" Test where visual-auditory-kinesthetic (see-hear-say) stimulation is employed, the diagnostician is able to combine evidence from two different tests to draw conclusions about preferred modalities. The individual who exhibits limitations in associating symbols with pictures when only visual stimulation is employed but shows improvement when visual and auditory (see & hear) avenues are employed may also show increased competency in word learning when he sees, hears, and says words. Such a pattern gives evidence for combining modalities to achieve effective learning. (p. 7)

Learning Methods Test

This test was developed by Mills in the 1950's. It was aimed at determining the response of pupils to specified teaching methods which provide for emphasis to a designated teaching procedure. Rather than isolating a specific learning modality for consideration the "methods" employed by Mills tend to involve several learning avenues with increased attention to one and avoidance of certain specific procedures. Mills notes in his Manual of Directions that there is no pure method or approach to the teaching of word recognition. All words have visual, phonic and kinesthetic elements which cannot be divorced completely from each other. When Mills speaks of the phonic method, he means that stress becomes the differential between that and other various methods.

The four learning (or teaching) methods used in the Mills Learning Methods Tests are:

1. The Visual Method
2. The Phonic or Auditory Method
3. The Kinesthetic or Tracing Method
4. The Combination Method

Mills concluded from his studies in developing and using his instrument that efforts to find a single best method to serve all pupils are inappropriate. He calls for matching the method

with the learner. And it is this matching which appears to be the challenge! (p. 6)

New York University Modality Test

The purpose of this test is to identify the preferred learning modality of a pupil from among auditory, visual, and kinesthetic modalities. The test was developed and pilot tested during the summer of 1968 under a research grant from the New York University Office of Educational Services to the principal investigators.

The criteria used for the development of the test included: appropriateness for first grade children, operational definitions of modalities, and efficiency of administration in a school setting.

From the pilot and from the comments of the reviewers the test was revised and shortened. The revised form which has currently been used consists of:

1. visual subscale - 27 items including 12 symbolic shapes, four individual letters and eleven letter forms including two and three letters.
2. kinesthetic subscale - 27 items in three-dimensional form identical to the visual items.
3. auditory subscale - 3 items using tapping patterns and eleven items using the letter forms (which now become sounds) of the visual and kinesthetic subscales.

Appendix B

Glossary

- auditory-visual transfer — intersensory transfer between the auditory
 auditory-visual integration — and visual channels
- cue summation theory — a theory which predicts that discriminative learning
 is increased as additional cues or stimuli are pre-
 sented.
- intersensory perceptual reaction time — measure of time required to effect
 intersensory perceptual shifting
- intersensory perceptual shifting — the shifting of attention from one mode
 to another
- intersensory transfer — translation of information from the terms of
 intersensory integration — one sensory input channel to those of another,
 cross-modal transfer — enabling information to become analagous
- intersensory facilitation — through association
- ipsimodal stimuli — those presented in different forms of the same mode
 (e.g. pictures and written words)
- modal preference — that mode preferred by an individual or by the
 optimum learning mode — majority of a group, as indicated by preference
 ranking or task performance
- mode — a sensory channel through which sensations are trans-
 mediational channel — mitted and received (e.g. vision, hearing, touch,
 sensory channel — and muscular movement
- proprioceptor — any of the sensory end organs in the smooth muscles, joints
 and tendons that are sensitive to the stimuli originating in
 these tissues by the movement of the body or its parts. The
 proprioceptors are basic to all human movement.

Appendix CBibliography for Additional Reading

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