DOCUMENT RESUME

ED 155 618 CS 004 133

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TITLE Applications of the Audread Model to Reading Evaluation and Instruction.
INSTITUTION Pittsburgh Univ., Pa. Learning Research and Development Center.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE Apr 76
CONTRACT 400-75-0049
NOTE 74p.; Paper presented at the Conference on Theory and Practice of Beginning Reading Instruction, University of Pittsburgh, Learning Research and Development Center, April 1976; For related documents, see CS 004 132, CS 004 135, CS 004 137-173, ED 125 315 and ED 145 399; Best copy available

EDRS PRICE MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS Adult Basic Education; *Beginning Reading; Communication Skills; Conference Reports; Developmental Stages; *Language Development; Models; Primary Education; Reading Instruction; *Reading Processes; *Reading Research; *Reading Skills; Written Language
IDENTIFIERS *Audread Model; *Oral Language

ABSTRACT

The primary thesis of the "audread" model of language development is that children in a literate society first learn to think, then they learn to communicate and receive thoughts through oral language, and then they learn to communicate through written language (graphic representations). Four projects based on concepts from the audread model are an experimental evaluation of the extent to which first grade students learn to read their own and their peers' spoken language, the development of an experimental test for measuring adults' auding/reading comprehension abilities (decoding skills), a program designed to improve the oracy skills of primary school children, and a job-related literacy training program for adults. Analysis of these projects shows how the audread model affects them first by suggesting relationships among skills to be explored, and then by constraining the decisions related to content, sequence, and modality in evaluation and instruction. (A transcript of the discussion following presentation of the paper is included.) (Author/RL)

APPLICATIONS OF THE AUDREAD MODEL TO READING EVALUATION AND INSTRUCTION

by

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(AUDREAD Model)

Prepared for

The Conference on Beginning Reading Instruction
Learning Research and Development Center, University of Pittsburgh
April, 1976

Conferences supported by a grant to the Learning Research and Development Center from the National Institute of Education (NIE), United States Department of Health, Education, and Welfare, as part of NIE's Compensatory Education Study. The opinions expressed do not necessarily reflect the position or policy of NIE, and no official endorsement should be inferred. NIE Contract #400-75-0049

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Thomas G. Sticht

This paper is concerned with the relationship of oral language to written language as developed in the developmental model of auding and reading (the AUDREAD model) presented by Sticht and colleagues (1974), and by the writings of Fries (1963).

In the work of Fries, several points are made which have been further developed in the AUDREAD model. These points are:

1. He distinguishes meanings from language and language from the stimulus displays used to convey the language. Thus, three components are involved in the communication process: meanings or thoughts; the language as an internal representation of these thoughts; and speech or writing as external representations of the internal language signals.

2. Reading involves the use of the same internal language representations of thoughts as are used earlier in comprehending spoken language; a process which, following Brown (1954), we will call *auding*. Thus, auding preceeds reading developmentally, and reading utilizes the same language signals as used in auding.

3. Auding and reading utilize the same language system for representing the same thoughts; i.e., they both share the same meaning system. Thus, in learning to read, the person learns to comprehend by reading what could previously be comprehended by auding.

4. With sufficient practice, the reader not only comes to comprehend by reading what he previously could comprehend only by auding, but he also becomes as efficient at developing internal language signals from the written display, as he previously was at deriving internal language from speech displays. This occurs as the *decoding* component of reading becomes automatic.

In Fries' work, he takes for granted that once the reading skill is developed, students will derive meanings from the printed page comparable to those derived earlier from the spoken word. He focuses his attention on the "transfer" skills involved in learning the visual signs for language. Others who have been concerned with various aspects of "decoding" have also focused on the skills students need to learn the printed language. Considerable debate has centered on this aspect of learning to read; this debate has been documented and discussed thoroughly by Chall (1967).

Less systematic work, and certainly nothing of the order of Chall's book on aspects of learning the written "code", has examined the notion that the language signs and systems used in auding and reading are the same, and that the meaning outcomes of auding and reading are the same. Sticht et al (1974) present an extensive study of these relationships. In this work, developed before having read the work of Fries, many of the ideas expressed by Fries have been integrated into a developmental model of the language skills of auding and reading.

THE DEVELOPMENTAL MODEL

Briefly, the model states that when a child is first born, he or she is born with certain Basic Adaptive Processes for adapting to the world around them. These BAP include certain information processing capacities for acquiring, storing, retrieving, and manipulating information. This stored information processing capacity forms a cognitive content which, in its earlier forms is pre-linguistic. After some time though, the child develops skills for receiving information representing the cognitive content of others, and for representing his own cognitive content to others. This is accomplished through the specialization of the information processing activities of listening, looking, uttering, and marking. The specialization is one in which these skills are used for the express purpose of externally representing one's own thoughts for others to interpret, and for forming internal representations of the external representations of others' thoughts that they make. More specifically though, the particular specialization of present concern is the representation of thoughts via the use of conventionalized signs (words) and rules for sequencing these signs (syntax) in speaking and auding (listening to speech in order to language).

Finally, if the child is in a literate society, he may acquire the specialized looking and marking skills of reading and writing. For present purposes, we presume that we are talking about the "typical" case in our literate society, and assert that children typically learn to read and write.

A further aspect of the developmental model, is that it holds that the development of the oracy skills requires the development of the cognitive content through intellectual activity which we call conceptualizing ability. In other words, the development of the oracy skills of speaking and auding follows and is built upon a pre-linguistic cognitive content and conceptualizing ability. Said plainly, the child must have something to think about before the need for a language ability for sharing thoughts can and needs to arise. It is important that it be understood that this early, pre-linguistic cognitive content, or *knowledge*, is what will form the foundation for the acquisition of new knowledge over the lifetime of the person. Thus, any concern for the child's acquisition of literacy skills must be traced back to the child's pre-linguistic acquisition of knowledge, and later his acquisitin of knowledge of and via the oral language.

A final aspect of the model is that it asserts that the literacy skills utilize the same conceptual base (cognitive content; conceptualizing ability; knowledge) as is used in auding and speaking, *and* utilizes the same signs and rules for sequencing those signs as is used in the oral language skills for receiving and expressing conceptualizations. Notice that this is an assertion based upon the developmental sequence; i.e., the literacy skills are built upon existing oracy skills as the end of a developmental sequence. This does not mean that once literacy skills are aquired, that they do not contribute anything new to knowledge or language capability; clearly they do. What is asserted is that when the literacy skills are initially acquired, they are essentially to be construed as a

second way of utilizing the same language system the child uses in speaking and auding. Presumably, this is what is meant when one talks about being able to use language by eye as well as it is used by ear (Kavanaugh and Mattingly, 1972).

Hypotheses Derived from the Audread Model

From the Audread model, four hypotheses have been formulated and evaluated regarding relationships of auding and reading at the level of meaning outcomes, or "conceptualizations". Extensive literature review has supported the following hypotheses.

Hypothesis 1 — Ability to comprehend language by auding ought to surpass ability to comprehend language by reading in the early years of schooling; this "gap" should close as reading ability is acquired.

This hypothesis has struck some as so commonplace as to be true but trivial. Of course, they argue, children who cannot read cannot comprehend the printed language! But this misses the point and assumes, as Fries did, the validity of what is offered here as an hypothesis — that is, that when children learn to read, they learn the same language signs as used earlier in auding and derive the same meanings. If not, how could they perform written comprehension tasks, using the graphic version of the same words as used in the spoken language, and presented as auding comprehension tasks?

This hypothesis also calls attention to the "closing of the gap" between auding and reading as the latter skill is learned. Literature review suggests that, on the average, it may take as long as 6 to 8 years for students entering first grade to develop the reading process to the point where it ". . . is so automatic that the reading is used equally with or even more than live language in the acquiring and developing of experience . . ." (Fries, 1963, p. 132). This very fundamental process, i.e., the development of reading into an alternative language skill of equal effectiveness and efficiency as auding, has received practically no research. True, as reviewed in the work by Sticht and Beck (1976), both Spache and Durrell have considered this problem and have developed tests to assess differences between auding and reading skills. But neither they nor, to my knowledge, anyone else have conducted studies of how long it typically takes for students to learn to read; i.e., to become as accurate and efficient in using the printed language as they are in using the spoken language. The development of a test for this purpose, for use with adults, is described later in this paper.

Hypothesis 2 — Ability to comprehend language by auding should be predictive of ability to comprehend language by reading when that skill is developed beyond the decoding stage.

If it is true that in learning to read, one becomes capable of comprehending in print what could be comprehended previously by auling, then it follows that those of high auding ability (i.e., large vocabulary; verbally fluent; capable of storing and retrieving spoken messages accurately and efficiently) will be high in reading ability, and the parallel situation will hold for those of low auding ability.

It is important to keep in mind that this relationship holds after the learning to read (decode) period is complete. Obviously, if no one of a group of auders could read, then the correlation of auding and reading would be zero. The correlation between auding and reading should, and literature review suggests it does, grow larger with increased years of schooling (at least up to the 4th grade by the current, limited literature).

Loban (1964) presents data which all too clearly indicates that students low in oral language skills, including auding, as well as various speech measures, become students low in reading skills over the school years. Students high in oral language skills become the more able readers. In fact, the groups grow farther apart over the school years.

Again, there is distressingly little well designed research related to Hypothesis number two. The literature reviewed by Sticht et al (1974) used different tests at different grade levels. None of the tests were designed for maximal comparability of auding and reading skills; nor have longitudinal studies been conducted to determine relationships between pre-reading auding skills and reading ability as the latter skill is developed over the school years.

Hypothesis 3 – Training in comprehending by auding should transfer to comprehending by reading when that skill is developed beyond the learning to decode stage.

If both auding and reading utilize the same conceptual or meaning base, then concepts added to that conceptual base via auding ought to be accessible by reading, when the latter skill is developed. The validity of this hypothesis underlies the practice which teachers follow of defining new reading words in oral discussions. If there is no transfer from the comprehension of the word and its meanings developed through auding, then it would do no good for teachers to define and discuss words in the oral mode.

Again, there have been few well designed studies of the transfer from training in comprehending by auding to comprehending by reading. Efforts in compensatory education which have attempted to improve children's oral language and hence written language skills have at times failed to consider that the effects of such training can best be assessed after the decoding skills of reading are acquired. Hence, failure to find such transfer effects may be due to premature evaluation.

Also, some studies provide training in oral vocabulary and comprehension tasks in the oral language, but then test for the effects of such training on reading comprehension with the latter tests utilizing completely different vocabulary items and content domains. This reflects the notion that some "generic comprehension skills" are being developed, rather than recognizing that the vocabulary and comprehension tasks performed on specific content domains in the auding training should form the basis for testing following reading training.

This problem emerges at times as the question of "mismatch" between the student's knowledge formed by experience in the world and by oral language, and the knowledges and language terms used in reading texts. Merely having a student develop skill in sight-sound correspondences, so that words in print can be decoded and spoken rapidly, which could be accomplished using nonsense words, does not ensure that the student will comprehend those words. If they are not in his prior spoken language repertoire, then, unless the words around the target word are in the auding repertoire, and the meaning of the target word can be inferred from context, the child cannot be expected to comprehend the selections as well as those who know

the meaning of the target word. Such problems underlie the current concerns that reading materials should reflect the cultural experiences of the students who use them. Also, if education in the oral mode is going to emphasize vocabulary and concepts relevant to a particular minority culture, then the readers these students encounter should also incorporate this language and concept domain for adequate transfer in comprehending by reading.

Of the studies reviewed by Sticht et al (1974) related to Hypothesis 3, those which demonstrated transfer from auding to reading suggested that such transfer was most likely to be indexed when the skills and knowledges of the auding training and measurement tests more closely resembled the skills and knowledges used to measure the effects of such training on reading test performance. Future work should develop programs and tests explicitly designed to assess transfer from auding training to reading.

Hypothesis 4 — Maximal rates for auding and reading will be comparable after the reading skill is developed beyond the learning to decode period.

If reading utilizes the same languaging and conceptualizing skills as used in auding, then the maximal rate at which the former processes can be performed will limit the rate at which both auding and reading can be performed. Assuming that the reading decoding skill develops to the point of automaticity and becomes as efficient as the decoding skills used in auding, then auding and reading ought to be performed at the same maximal rate; i.e., that at which languaging and conceptualizing can be performed.

Once more, few adequately designed studies are to be found comparing rates of auding and reading. One of the earliest and best designed studies was by Goldstein (1940), who reported comparable immediate retention comprehension scores for auding and reading over speech rates from 100 to 322 words per minute (wpm). Carver's (1973) work represents the best on this problem of which I am aware. He too [illegible]parable performance by auding and reading for rates from 75 to 450 wpm.

In both the Goldstein and Carver studies, auding and reading scores declined comparably and significantly at the faster rates. Since both of these studies used skilled adult readers (college students), there is no evidence here that reading can be or is performed at exceedingly fast rates, e.g., 1,000 to 10,000 wpm, without significant losses in comprehension (at least as indicated by immediate retention and judgments of information stored indices of comprehension). The rates at which languaging and conceptualizing can be performed set limits for both auding and reading.

A Contrasting Point of View

The foregoing view of reading as a skill developed upon the same linguistic structures and semantic outcomes as used in the earlier oral language is somewhat different from the view of reading and auding discussed by Mattingly (1972). There he proposes that "While it is clear that reading somehow employs the same linguistic processes as listening, it does not follow that the two activities are directly analogous. There are, in fact, certain differences between the two processes that cannot be attributed simply to the difference of modality, and which

therefore make difficulties for the notion of a straightforward inter-model parallel." (pp 134-135)

Mattingly then discusses several differences between listening and reading which he believes supports the notion that reading is not analogous to listening.

> 1. "To begin with, listening appears to be a more natural way of perceiving language than reading; 'listening is easy and reading is hard' [Liberman, in Kavanagh, 1968, p. 119]. We know that all living languages are spoken languages, and that every normal child gains the ability to understand his native speech as part of a maturational process of language acquisition . . .
>
> In contrast, relatively few languages are written languages. In general, children must be deliberately taught to read and write, and despite this teaching, many of them fail to learn." (p. 135)

The argument that listening is more "natural" than reading is not very convincing because both are information processing skills developed by the human organism as expressions of the basic adaptive processes with which the species is endowed by "nature" (i.e., genetic inheritance). Neither is more "natural" than the other.

We can also question the notion that "listening is easy and reading is hard". The fact is that the vast majority of people who set out to learn reading as an alternative way of using the language skills developed for oral language do learn just that, and many accomplish this with little or no "official" instruction. (Söderbergh quotes Gates quoting a study (!) suggesting that 80% of the children beginning school in the USA can read some words; all of the 40+ children studied by Keithly (1974) at the beginning of first grade could read some words; Durkin (1966) reports on children who learn to read quite well before beginning school.) Perhaps

only some 15 to 20% of children have difficulty learning to language by eye as well as they can by ear.

In fact, much of what is frequently regarded as a reading problem, and what would lead people to believe that "reading is hard", is a language problem! Many people who can read as well as they can aud, cannot aud too well. In this regard, Sticht & Beck (1976) found that a group of adult men in a remedial reading school for persons reading below the 6th grade level had mean auding scores at the 5.2 grade level and mean reading scores at the 4.9 grade level. Thus, their "reading" problem might just as readily be identified as an "auding" problem — with low language/conceptualizing skills underlying both.

> 2. "The apparent naturalness of listening does not mean that it is in all respects a more efficient process. Though many people find reading difficult, there are a few readers who are very proficient: in fact they read at rates well over 2,000 words per minute with complete comprehension. Listening is always a slower process: even when speech is artificially speeded up in a way which preserves frequency relationships, 400 words per minute is about the maximum possible rate [Orr, Friedman, et al, 1965]." (p. 135)

This argument runs directly counter to Hypothesis 4, above. Evidence to date does not favor the statement that some readers may read "over 2,000 words per minute with complete comprehension". In fact, it is not even clear what "complete comprehension" might mean. Does this mean they perform on comprehension tests following the reading of material at 2,000 wpm just as well as they can after reading at 150 to 200 wpm? What are such tests like? Carver (1971) has reviewed the research on speed reading and

finds no evidence for the supposed phenomenon. As mentioned earlier, when both auding and reading materials were presented at controlled rates by Goldstein, both auding and reading scores declined as the rate was increased. Also, the National Assessment of Educational Progress: Reading Rate and Comprehension (1972) reported that of a national, representative sample of adults, only 17 out of 7,850 persons read in excess of 750 wpm — and these readers could not consistently answer four out of five of the comprehension questions for two selections. It appears then, as though the appeal to speed as a major distinguishing factor between auding and reading processes lacks convincing evidence. Both rate of auding and reading are limited by the rate at which thinking about the incoming information can be accomplished. Data reported by Sticht et al (1974) suggests this may be optimal somewhere around 200 to 300 wpm.

> 3. "Moreover, the form in which information is presented is basically different in reading and in listening. The listener is processing a complex acoustic signal in which the speech cues that constitute significant linguistic data are buried." (p. 135) . . .
>
> "The reader, on the other hand, is processing a series of symbols that are quite simply related to the physical medium that conveys them." (p. 136) . . .
>
> "That these differences in form are important is indicated by the difficulty of reading a visual display of the speech signal, such as a sound spectrograph, or of listening to text coded in an acoustic alphabet . . ." (p. 136)

Mattingly goes on to point out that a spectrograph contains most of the essential linguistic information, but is extremely difficult to "read", even with much practice. But of course the fact that some visual displays

of speech are more visually complex and difficult to read than others in no way at all repudiates the similarities between auding and reading. It merely shows that one can construct an almost impossible-to-use visual display of speech. Furthermore, the differences addressed here lie at the level of decoding of the stimulus input, not the language or meaning levels. It is obvious that the forms of the environmental displays are different — one is mechanical and the other electromagnetic energy. Auding can be done in the dark; reading can be accomplished in noise. The speech stream must be segmented, the written display comes segmented (though this was not always so). But it is not at this level of processing that auding and reading are to be considered analogous. Rather, it is at the levels of internal language representation and the construction of conceptualizations that the two processes are analogous.

Though Mattingly argues that reading is not to be viewed as a "parallel" or "analogous" activity to auding, for the reasons given above (and similar other reasons not mentioned here), he does feel that ". . . reading somehow employs the same linguistic processes as listening . . ." (p. 134); that reading is ". . . a language-based skill . . ." (p. 141); and that ". . . reading is parasitic on language . . . dependent upon the speaker-hearer's awareness of certain aspects of primary linguistic activity. By virtue of this linguistic awareness, written text initiates the synthetic linguistic process *common to both reading and speech*[1], enabling the reader to get the writer's message and so to recognize what has been written." (p. 145). This is essentially what has been maintained by Fries (1963) and Sticht et al (1974).

[1] Italics added.

An additional view which, if not contrasting with the views presented by Fries and the four hypotheses given earlier, at least would temper them, is given by Gibson (1972). In a discussion of transfer from the oral language to the written language, she continues:

> "What about the *semantic* aspect of reading? Here the relationship, for the mature reader, might seem one of direct transfer. If the reader can decode a written word to its phonological representation, he hears it and presumably might discover its meaning at once without further learning. . . . But everyone knows that 'reading for meaning' does not come easily in the early stages of learning to read. . . . Evidence suggests that getting meaning directly from a written word, even when its spoken counterpart is well known, is not immediate and automatic as soon as the child is able to decode the written symbols to speech. He progresses gradually toward immediacy in grasping meaning from the spoken word. . . . It is not enough, then, to speak of simple transfer of meanings from spoken to written messages. . ." (pp 13-14).

Here, Gibson does not seem to be questioning that meanings generated by the written word will be the same as those generated by the previously learned spoken word when the decoding skills of reading are learned. Rather, she questions the automatic nature of this transfer, and mentions evidence (but does not provide specific citations) suggesting that such automatic transfer does not always occur. Clearly, this is an important issue which should receive competent investigation. Many of the transfer studies examined in regard to Hypothesis 3, above, were not designed to properly evaluate auding to reading transfer. The best designed studies showed such transfer, at least with respect to group means. But it is not known to what extent individuals may fail to accomplish such transfer.

The phenomenon of "word calling" has been noted by reading specialists, but I am not familiar with research on this topic.

Another aspect of reading and auding which should be mentioned is the difference between what can be comprehended by auding and reading. It is clear that the auding message contains suprasegmental information and acoustic spectral information which may permit the auder to gain a type of comprehension that cannot be gained from reading. For instance, the speaker's sex can frequently be determined from the speech signal, while writing does not convey this information (unless included in the writing as a specific fact of information). Knowledge of the sex of the speaker may bias comprehension.

Likewise, the printed page carries information which the spoken word does not — such as the color of the ink, or quality of the paper. These factors may impart a bias to comprehension due to aesthetic responses by the reader.

Because of these differences in the information displays, a type of comprehension unique to each modality is possible. In considering the learning of reading, however, emphasis has been on the information conveyed by the morphemes of the oral language, and how the student comes to recognize these morphemes using the written display. This orientation has resulted in a focus on comparisons of comprehension of written prose material presented for reading, with such prose presented in spoken form for auding. Thus, research has not stressed comparison in comprehending spontaneous speech by auding, with its characteristic pauses, mazes,

introjections, etc., with comprehension of written, well-formed prose by reading. However, for some recent work along these lines see Walker (1975-6).

A final point concerns differences frequently mentioned regarding the nature of information processing in auding and reading. The spoken message typically comes and goes as a transient signal which the auder must "track" at the rate the speaker chooses, and with the ideas organized and sequenced by the speaker. The reader can read a page of prose in any manner desired, from left to right, top to bottom, or the reverse of these directions, or by jumping about in any sequence desired and at any rate desired. But this use of the printed page should be distinguished from the act of reading per se; the latter occurs whenever the eye stops moving about, fixates upon the printed words, and recodes the words at that point of fixation into internal language representations. What the reader does with that information then, in terms of building conceptualizations, will depend on what the reader is trying to accomplish.

Furthermore, the use of the printed page in the flexible manner described above typically will not occur until the person has developed reading skills which approach his skill in auding. Though, because the printed page is relatively permanent and can be studied, persons unskilled in reading compared to their auding skills may perform better with printed materials, given considerable more time for reading than is available for auding.

In discussions of auding and reading then, it is necessary to keep in mind the differences between learning to read and skilled reading, and

the act of reading versus the selection of what will be read and the thinking about what is read. It is also important to note that written words can be treated simply as visual patterns, not as representations of spoken words, and as such may be used in any number of tasks such as searching and scanning tasks, perhaps as would be performed in certain copy proofing or sorting and filing jobs. Before developing reading skills, the person typically has developed considerable visual information processing skills called looking skills. Reading develops as a special kind of looking — looking at script in order to language. Thus, all reading is looking, but not all looking is reading. Written displays can be processed through looking skills for a variety of tasks. In the present work, however, we are interested in the development of reading as a languaging skill.

Applications of the Model of Auding and Reading Development

As discussed by Fries (1963) and Sticht et al (1974), in the typical case, people first develop language vocabulary and comprehension skills by means of the oral language skills of auding and speaking. Then, when they begin to learn to read, they must learn to comprehend by reading as accurately and efficiently as they previously could comprehend by auding.

From this point of view, it is possible to consider that in learning to read, people must close the "gap" between two skills, auding and reading, both of which permit them to comprehend linguistic messages. Two research projects will be summarized which are concerned with assessing the language by ear and by eye gap.

Reading Talk in the First Grade

In her thesis, Keithly (1974) obtained a measure of the gap between first grade children's speaking ability and their ability to read their own spoken language when it was presented in written (typed) form. Her decision to use samples of spoken language rather than to assess children's auding ability was based on the problems involved in developing auding tests which she could be certain contained content familiar to all children. Also, because auding is a special kind of listening, factors such as rate of presentation and noise, which can affect the listening process and hence the auding process, might lead to an inaccurate assessment of the child's auding ability. Finally, auding comprehension assessment involves the need for comprehension questions or other performance tasks which might well be more difficult to perform than the auding comprehension itself; this is especially true for young first grade children.

For these reasons, Keithly assumed that children have an understanding of the words and sentences they use in talking. Thus, it is not necessary to assess comprehension. If the same spoken words and sentences are presented in printed form for the child to read aloud, one can obtain an estimate of the extent to which the child can read what he can speak. Thus, the closing of the speaking-reading gap as reading decoding skills are acquired can be indexed.

Forty-eight first grade children, half boys and half girls, from three schools on the Monterey Peninsula of California were studied.

About 83% were Caucasian-Anglo, with the remaining 17% approximately equally distributed as Blacks, Spanish-Americans, and Orientals.

Samples of spoken language were obtained during October and November (school started in September) of 1973. To elicit conversation from the children, they were induced to speak about a family photo brought from home, personal questions about themselves (hobbies, likes, dislikes) their families, exciting things that had happened to them, and questions about a series of eight magazine pictures. All conversations were tape recorded. Tapes were transcribed excluding interjections such as "huh?" and "um"; slang such as "yup"; sounds like "whooo" for Halloween ghosts. Incorrect contractions such as "em" for "them" and "gonna" for "going to" were corrected for printed presentation.

After a period of five days, each child was asked to read his typewritten speech sample. Additionally, each child read two of the stories dictated by other children (called peer stories). This was done to determine how general the child's reading ability was.

During April-June 1974, children were asked to re-read their stories and their peer's stories. The differences between their Fall pre-test and the Spring post-test reading scores constituted the major data of interest. Table 1 presents frequency distribution and measures of central tendency and variability for the childrens' readings of their own stories. These data are based upon the percent correct of the different types of words correctly read aloud by the child. Thus, if a word occurred more than once, it was scored only one time, though it had to be correctly

read each time it was encountered for credit. No child scored 0%, while three children scored 100% correct in the pre-test. The median pre-test score was 11.3% correct, and this rose to 84% correct at the post-test, indicating considerable improvement in reading for these children.

Generally speaking, there was a high relationship between being able to read one's own words in prose and the words of one's peers. Though, due to the existence of polar groups, those who could read more than 80% of their own and their peer's transcriptions, and those who could read less than 30% of their own and their peer's transcriptions, the correlations were overestimates, and were in the high nineties. Inspection of the data confirm that if a child can read his own words, he is likely to be able to read the words of his peers.

Additional data obtained indicated correlations of 0.5+ between scores on the Murphy-Durrell Reading Readiness Test (1965) given at the beginning of school and children's scores on the pre-test reading of their own and their peer's stories. Post-test correlations between reading the transcriptions of speech and the Cooperative Primary Tests (1970) were in the area of 0.8+. Finally, it was found that the child's reading of his own story at the beginning of first grade was slightly better than the Murphy-Durrell Reading Readiness Test for predicting end of first grade Cooperative Primary Test scores ($r = 0.6$ compared to 0.5 for the Murphy-Durrell) and of equal accuracy in predicting reading of the child's own story at the post-test session ($r's = 0.6+$ in both cases).

Table 1

Frequency Distribution of the Percent Correct
for Children Reading Transcripts of Their Own Speech
at the Begining (Pre-Test) and End (Post-Test) of the First Grade

	Frequency		Percent		Cummulative Percent	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
90-100	5	16	10	40	100	100
80-89	0	6	0	15	88	60
70-79	3	3	6	7.5	88	45
60-69	0	1	0	2.5	82	37.5
50-59	0	1	0	2.5	82	35
40-49	2	0	4	0	82	32.5
30-39	3	3	6	7.5	78	32.5
20-29	4	5	8	12.5	72	25
10-19	10	3	21	7.5	64	12.5
0-9	21	2	43	5	43	5
Median	11.3	84.0				
Mean	25.6	67.6				
S.D.	30.9	33.9				

While Keithly's study demonstrates that many children make considerable improvement in closing the speaking-reading gap in the first year, there were also many children who did not make much progress in this direction. Seventeen of the forty children for whom pre and post test data were available scored 10% or less on the pre-test reading of their own story; three (18%) of these scored less than 10% on the post-test at the end of first grade, and 2/3 scored less than 30% correct on the post-test.

The utility of Keithly's approach to assessing reading has not been fully explored. It is an interesting approach because it has great face validity, and because it relates rather nicely to the *language experience* method of teaching reading which many teachers and reading specialists favor. Generally in this method, children (or even adult reading students) maintain files of words they and their classmates have contributed from their oral language repertoire, and which they have learned to read. Keithly's approach formalizes the gathering of information about the words students are able to speak which they also learn to read. The pre-test and post-test measures provide a summative measure of achievement which is compatible with the language experience approach, but which is not obtained by the method of cummulating words as they are learned.

Future work along these lines should include tests of comprehension because, even though the children relate their own materials, it is not certain that they would be able to comprehend these materials at a later date.

Assessing the Auding and Reading Gap in Adults

The major thesis of the developmental model of auding and reading is that people first develop vocabulary and comprehension skills by means of the oral language skills of auding and speaking. Subsequently, when people begin to learn to read, they must learn to comprehend by reading what they previously could comprehend only by auding. The person's task, then, in learning to read is to learn to comprehend the printed form of language with the same accuracy and efficiency as he can comprehend the spoken form of language.

According to the model, therefore, auding vocabulary and comprehension should exceed reading vocabulary and comprehension for those individuals who have not acquired automatic reading decoding skills. However, after attaining mastery in decoding, auding and reading levels become equivalent. Thus, it is considered that, in learning to read, people gradually "close the gap" between their ability to comprehend spoken language and their ability to comprehend printed language.

An implication of this hypothesis is that the development of an auding/reading test battery capable of indexing discrepancies between these abilities would be useful in revealing the degree to which reading problems reflect difficulties specific to handling language in printed form, or low levels of language ability in general. A comparison of auding with reading would be beneficial in indicating the nature and extent of a reading problem, while providing information regarding the type of reading training which might be necessary.

To explore the applicability of this auding-reading "gap" concept to identifying remedial training needs and predicting improvement in literacy training for adults, the Air Force Human Resources Laboratory/Technical Training Division sponsored research on the development of an experimental Literacy Assessment Battery (LAB) (Sticht & Beck, 1976). Prior to the development of such a battery, however, existing auding-reading type tests were examined and tried out, and a technique for obtaining an estimate of automaticity of decoding skill was developed and investigated.

Two standardized tests currently exist which measure both auding and reading, and which provide comparisons between these two abilities for the purpose of identifying individuals with reading "potential" (whose auding performance exceeds reading performance). These tests, the *Diagnostic Reading Scales* (Spache, 1972) and the *Durrell Listening-Reading Series* (Durrell and Brassard, 1970) were developed for and standardized on school children, but were examined to investigate various approaches which might be used to measure reading potential with adults.

The "closing of the gap" between auding and reading is accomplished as the ability to decode printed language develops. Like the speech decoding skill, the print decoding skill must be developed until it can be performed pre-attentively, so that attention can be focused upon processing meaning from the message. Because of the importance of acquiring this automaticity of decoding, a technique was explored for evaluating a person's level of automaticity in reading-decoding skill.

The results of the research on the measurement of reading potential, and research indexing the automaticity of decoding, suggested that it

would be feasible to formulate a Literacy Assessment Battery (LAB) which operationalized instances of these concepts.

Implementing an Approach for Assessing Reading Potential in the LAB: The choice and subsequent implementation of an approach for assessing the auding and reading gap must take into consideration the purpose of the test, including the population for whom the test is intended; the decisions which one wishes to make using the test results; and the conditions under which the test will most likely be used, including funds available to administer, score, and interpret the test results.

The population for the LAB are secondary school students and adults who present themselves or have otherwise been identified for basic literacy training. Generally, this will be students who would routinely score at or below the 6th grade level on a grade school normed, standardized reading test.

The primary decision the LAB test should facilitate is whether a person is unskilled primarily in the use of the printed form of language and of average or thereabouts skill in relation to his age peers in processing prose materials when presented in spoken form; or is the person equally unskilled or equally skilled in both forms of language processing. More explicitly, the question of interest is: *Does a person's ability to read and store printed information for subsequent use in an immediate retention test equal his ability to store and retrieve printed information when that information is presented in spoken form at rates comparable to that typically used to present printed prose orally*, as by newscasters and professional oral readers (for example, those who record "talking books"

for the blind)? The LAB test aims to facilitate decisions as to whether the answer to the above question is yes or no.

It is important for understanding the LAB approach to auding-reading assessment that a clear understanding of the above statement is obtained. The statement is meant to indicate that the LAB does not attempt to determine how well people can comprehend spoken language and whether or not they can comprehend this spoken language when it is presented in printed form. To do this would mean that a method had been developed for determining the range and extent of spoken language which people can aud and comprehend — which has not been done. Instead, interest is in knowing if a person cannot read and store information from printed language of a given difficulty level, can they process that type of language and perhaps even more difficult materials more effectively when it is presented in spoken form? This reflects the primary interest upon *reading*. Very few situations in adult life call for reading printed versions of spoken language, with its hesitations, false starts, pause delays, and so forth. Hence, the LAB attempts to determine if a person is more effective at storing language information in a retrievable manner when that information is presented in spoken versus printed form.

The latter sentence indicates a further restriction to the decision the LAB hopes to aid. There is no interest in knowing how well a person constructs meaning from texts by a perhaps long, arduous reading. Rather, interest is in knowing if the person's processing of information by the reading of a text is as *efficient*, as well as, as *accurate* as it is by auding the text. True equivalence of auding and reading processes is

achieved only when the latter process can be used as *efficiently* as auding for processing language into conceptualizations. Hence, an accurate measure of auding-reading differences must detect superiority of auding accuracy and/or efficiency over reading level where such superiority exists.

Secondary decisions arising from the foregoing considerations which are meant to be facilitated in the LAB include:

1. Given a positive reading potential, is the person's failure to achieve comparable reading level and reading potential scores likely to be due primarily to lack of knowledge encoded in the message, or to deficiency of skill in decoding, both of which could affect a person's ability to store sufficient information in a manner conducive to retrieval during the test period.

2. Given low scores for both auding and reading of passages, is a person's low score likely to be due primarily to lack of knowledge encoded in the message, or lack of skill in sequentially processing the information in a passage of connected discourse.

The conditions envisaged under which the LAB might be used include:

1. Small group or individual testing.
2. A testing time of around one hour or less.
3. Hand scorable for immediate use.
4. Limited use of audio hardware.

In summary then, the nature of the students, the decisions to be made, and the conditions of testing as given above all influenced the approach and the specific design features, such as type of content, response modes, etc. used to assess auding-reading differences in the LAB.

The Literacy Assessment Battery is comprised of three tests:

1. A Paragraphs Test designed to measure the discrepancy between a person's ability to efficiently store and retrieve language information presented as connected prose in spoken or written displays. This test consists of four paragraphs, 150 - 190 words in length, and of 9th grade level in readability, as determined by the FORCAST readability formula (Sticht, 1975-a). Two of the passages are presented for auding (Paragraphs: Auding); two for reading (Paragraphs: Reading). These passages were calibrated to be of equal difficulty. Following each paragraph, 12 constructed response, retention test items calling for (near) verbatim recall of factual information are administered. These questions are interrogative transformations of paragraph material, and were determined to be passage dependent (not answerable without having auded or read the passage). The questions following the auding passages are read aloud for auding. The questions following the reading passages are read silently by the student. Time for reading the paragraphs is limited to the time used to present the auding paragraphs. Time for reading the paragraphs questions (following the removal of the source passages) is limited to the time required to read the auding paragraphs questions aloud for auding.

2. A Vocabulary Test designed to measure the discrepancy between a person's knowledge of word meanings presented by auding and by reading. The vocabulary words were selected from the Paragraphs Test passages; this represents an attempt to be somewhat "diagnostic" and to determine whether or not poor performance on the Paragraphs Test might reflect lack of knowledge of word meanings. Additionally, however, the Vocabulary Test

provides evidence as to whether or not a person's performance on the Paragraphs Test may suffer due to the requirement to efficiently process information in connected prose format. There is a 14-item, multiple-choice Vocabulary subtest for each of the two Paragraphs: Auding passages, and one for each of the Paragraphs: Reading passages. The Vocabulary: Auding subtest is comprised of the two vocabulary tests made up of the words used in the Paragraphs: Auding passages. When the Vocabulary: Auding subtests are given, they are presented *both by auding and by reading*. When the Vocabulary: Reading subtests are given, they are presented for silent reading only. Thus, the Vocabulary: Auding subtest is actually a simultaneous auding *plus reading* subtest. This was done because in the Vocabulary Test, interest was in determining whether the person knew the words from the passages, not in assessing an auding-reading gap. Hence, all vocabulary could have been given by reading only. But it was thought that this would not profit the very unskilled reader who might be able to perform well on the Vocabulary Test if the words were presented for auding. Therefore, to determine if this made any difference, the Vocabulary: Auding (+ Reading) condition was included.

3. A Decoding Test designed to measure the efficiency with which a reading decoding task can be performed using units of connected discourse. This test represents an attempt to operationally index the degree of "automaticity" of decoding as discussed by Fries (page 1). With regard to reading, automaticity refers to the ability to decode print so efficiently that attention can be directed toward the processing of meaning instead of

toward the decoding task. It implies that skill in decoding has become so proficient that decoding can be done pre-attentively, and attention can more effectively be allocated toward conceptualizing the message.

In the LAB Decoding Test, the student is required to simultaneously aud and read passages at four rates of presentation; 100, 150, 200, and 250 wpm. The rates are established by the spoken message, and thus, the auding message sets the pace for performing the reading task. In each passage, a number of *mismatches* occur between words seen on the page and words which are heard. These mismatch words are syntactically and semantically acceptable substitutes, and therefore, are not detectable unless one both auds and reads. The student's task in this test is to identify and circle the mismatch words when they are encountered. The student's score is the number correct out of ten mismatches for each speech rate, and the total number correct for the four speech rates.

Results of A Tryout of the LAB: The LAB was administered to a group of 70+ men in a minimum security correctional facility in northern California. The Gates-MacGinitie Reading Tests, Survey D (1965) were also administered.

Figure 1 presents the results for the LAB Paragraphs subtests (Auding and Reading) and LAB Vocabulary subtests (Auding and Reading) in terms of the percent correct for men reading at different grade levels as indexed by the Gates-MacGinitie (GM) tests. As indicated by the Paragraphs Test, mean Auding scores exceeded mean Reading scores for men reading at the 6th grade level and below. A similar finding holds for the Vocabulary subtests. These data suggest that it is possible to detect an auding-reading gap using the LAB.

Figure 1. Mean percent correct scores for the LAB Paragraphs and Vocabulary Tests as a function of reading ability measured by the Gates-MacGinitie Reading Test. (See text for explanation of dashed lines.)

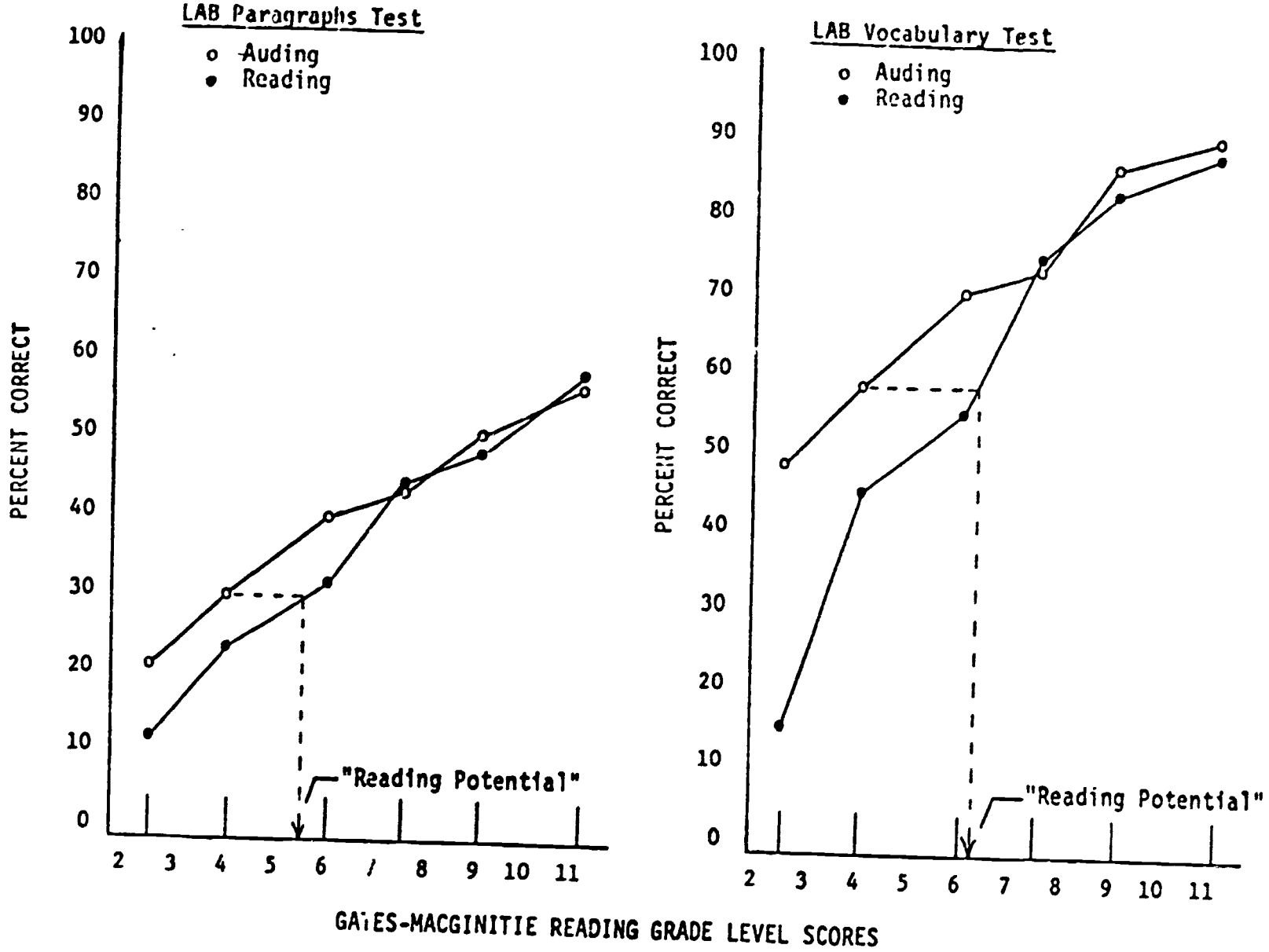

Figure 1. Mean percent correct scores for the LAB Paragraphs and Vocabulary Tests as a Function of Reading Ability Measured by the Gates-MacGinitie Reading Test. (See text for explanation of dashed lines.)

Also presented in Figure 1 is the concept of reading "potential". This is a concept suggested by the Diagnostic Reading Scales and the Durrell Listening-Reading Series. It is obtained by running a horizontal line from the Auding score for a given grade level to the Reading curve, and then dropping a perpendicular from the Reading curve to the abscissa. This shows the reading grade level a person would have achieved if he had read as well as he auded. Thus, in the example for the Paragraphs Test in Figure 1, a person having 4th grade level auding and reading skills (i.e., the mean percent correct Auding and Reading scores for men scoring at the 4th grade level on the GM test) has a *Reading Potential* score of 5.5 because his Auding score converts to that reading grade level following the procedure described above. The data of Figure 1 suggest that, even if many of these men were able to comprehend by eye as well as they can by ear, they would still be in need of considerable oracy and literacy training to raise their "potential" level.

Regarding the LAB Decoding Test results, mean scores for the 100, 150, 200, and 250 wpm rates were, respectively, 8.1, 7.7, 6.0, and 2.7 (out of 10 each) correct, with a total score of 24.7 (out of 40 possible) correct. Thus, a monotonic decline was obtained as a function of rate of presentation suggesting that the Decoding skills can be stressed in this manner to reveal persons possessing more or less automaticity of Decoding. The Decoding total test score correlated 0.7 with the GM speed of reading test, suggesting that the Decoding Test is a valid measure of reading (decoding) speed.

Interpreting LAB Test Profiles: By converting LAB scores to percentile scores, profiles of Paragraphs: Reading and Reading Potential (i.e., Paragraphs: Auding scores transformed to percentile ranks which would have been achieved if the person read as well as he auded, as in Figure 1), Vocabulary: Reading and Reading Potential, and Decoding (total) scores can be constructed. These profiles can be interpreted to aid in making the following decisions.

1. Does this person show reading potential for the Paragrapns test?
2. If so, is the reason his reading is not equal to his auding mostly due to lack of relevant vocabulary knowledge of the Reading Paragraphs, or is it likely to be due to a relative lack of skill in storing information from connected discourse in a retrievable manner?
3. If the person appears to lack skill in storing information in a retrievable manner, is this likely to be due to lack of decoding skill or to a particular problem in integrating information from connected discourse for storage and retrieval?

Figure 2 presents data for one of the men who took the LAB test. As indicated, he scored in the bottom quarter of people who took the LAB test on all three Reading subtests (Paragraphs: Reading, Vocabulary: Reading, and Decoding: Total score). His auding scores have been converted to reading *potential* scores and indicate that his *potential* for Paragraphs: Reading is around the 50th percentile. Thus, if he could read as well as he can aud, he would have been near the group mean for Paragraphs: Reading.

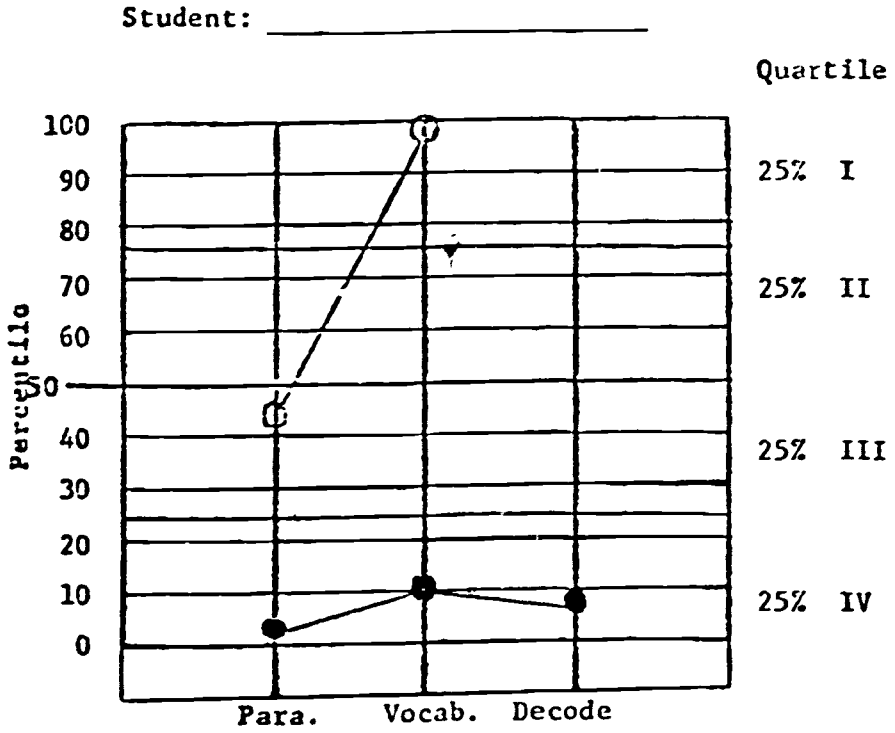

Figure 2. Profile for the LAB Test Results of One Examinee.

Figure 2. Profile for the LAB Test results of one examinee.[117]

The difference between his Reading and Reading Potential scores (auding) increases dramatically with the Vocabulary Test. This, coupled with the very low Decoding score suggests this person has a true deficit in reading decoding skills. For this reason, he cannot realize his Reading Potential levels.

Summarily, then, the LAB consists of three interrelated subtests. The Paragraphs subtest provides a measure of an individual's auding, reading, and reading potential levels. This is the major data provided by the LAB, and is intended to facilitate the *primary decision* of whether a person's ability to read and store information is equal to his ability to aud and store information; i.e., are his reading level and reading potential equivalent? The Vocabulary subtest aims to aid the *secondary decision* as to whether poor performance on the auding or reading Paragraphs subtest reflects low knowledge about the subject matter content, indexed by the knowledge of meanings of words from the Paragraphs subtest, or whether such poor performance reflects failure to efficiently process language information when presented in connected discourse. The Decoding subtest is used to facilitate the *secondary decision* regarding the outcome of the Paragraphs subtest by indicating whether poor performance on the Reading Paragraphs may result from lack of efficiency in decoding of print to internal language representations.

At the present time, the LAB test is an experimental test battery having had no operational use. It is unique in many respects, including its footing on the developmental model of auding and reading formulated by Sticht et al (1974), its interrelated Paragraphs and Vocabulary tests,

and the Decoding test involving simultaneous auding and reading. Further research is needed to refine the test and properly norm it; and operational research is needed to determine the utility of the test for practical instructional decision making.

An Oracy Training Program

According to Fries (1963) and the developmental model of Sticht et al (1974) *reading* is generally achieved by children only after they have achieved considerable *oral language* competency (i.e., a considerable vocabulary and the grammatical rules for generating sentences using the vocabulary). In fact, reading is considered to involve essentially the same vocabulary and syntactical rules as used in listening to and producing speech. Because of this, it seems reasonable to expect that a child's reading and writing vocabulary and ability to comprehend written language (that is, his *literacy* skills) can be improved by increasing his vocabulary and other language skills using the child's ability to comprehend and produce spoken speech (i.e., his *oracy* skills, oral language skills which parallel the *literacy* skills).

Based on the foregoing rationale, Melching & Whitmore (1975) developed an experimental program of Oracy Training (ORTRAIN) for 1st and 2nd grade students in a school district near Detroit, Michigan. According to these researchers:

> " The ORTRAIN program sought to attain these three main goals:
>
> 1. Establish (train) a small corps of primary level teachers in the District who would be able to provide special instruction to students in the acquisition of oracy skills. Since there were four elementary

schools, each having several primary classes, it was decided to train one teacher in each school. This training sought to make the teacher a "model" teacher of oracy skills. The teacher would then become the school "expert" in oracy instruction; she would not only teach students the desired oracy skills, but also be available to help other teachers in the school acquire oracy teaching capabilities.

To achieve this goal, a brief workshop was designed and conducted for teachers. A rationale underlying oracy instruction and some suggested classroom procedures for teaching oracy skills were treated. Reliable ways for recording the progress of students through the oracy teaching exercises were also considered.

2. Provide teachers with highly "structured" stimulus materials for the teaching of oracy skills. It was hoped that teachers might more confidently conduct oracy instruction if they had available an ample supply of already prepared teaching materials. It had been noted [previously] that some teachers viewed the need to develop oracy teaching activities as burdensome; they were in favor of the program, but they were reluctant to devote the extra time needed to develop necessary teaching activities.

To achieve this goal, special materials for teaching oracy skills were prepared for use by teachers. These materials gave explicit instructions to teachers and did not require them to spend much time preparing or selecting learning activities. In addition, arrangements were made to provide frequent consultations and assistance from both a local program coordinator and a member of the research staff.

3. Evaluate effects of oracy instruction on oracy skills of students. Once the oracy teaching activities were developed and teachers were trained in their use, an evaluation of the effect of these activities on students must be undertaken. That task was the ultimate purpose of the research effort.

To achieve this goal, a special oracy test was constructed. This test was administered prior to the start of the program to groups of project and control students. At the end of the school year, the test was again administered to the students." (pp 8-9)

The oracy skills to be taught were grouped into 12 categories expressed in terms of desired student actions.

"1. Names Objects: Nouns only
2. Describes Objects: Sensory components
3. Describes Objects: Structural components
4. Describes the sensory components of structural components
5. Describes Objects: Similarities
6. Describes Objects: Differences
7. Describes Objects: Spatial relations
8. Describes Objects as function of who is observing
9. Describes Objects as function of internal state of observer
10. Describes Objects as function of location of observer
11. Describes Events by sequence
12. Uses Language in a Social Sense." (p. 10)

Teaching activities were developed for each category. A sample teaching activity is given below.

" SAMPLE TEACHING ACTIVITY

2. Describes Objects: Sensory Components

New Directions in English Background and Beginnings — [Textbooks available to teacher]
P. 4 and P. 5
Adding (Shape: Common Analogies)
Show the child the pictures.
Questions: 'Which of these is round like a ball?'
'Which of these is square like a box?'
'What of these has 3 sides like a triangle?' "
(p. 11)

To determine which oracy skills needed to be taught, and to evaluate the effects of the oracy training, a special oracy test was constructed representing the categories of oracy skills given earlier. After various tryout and refinement activities, the final Oracy Test consisted of 15 items. The following test item illustrates the complexity which was involved in this testing.

"TEST ITEM 7, SKILL 5: DESCRIBES OBJECTS: SIMILARITIES

Materials: Set B, Item 7A, 5 pictures of objects – fruits, and Item 7B, 5 pictures of objects – animals.

Auding and Speaking: Present a set of 10 pictures of objects to the child, making sure that 5 of them are pictures of fruits. (The other 5 should be a buggy, chair, dog, book, spoon.)

Ask, 'Pick out the things that are alike in some way.' When the child is finished, ask, 'What do we call all these things?'

If the child can find only 2 or 3 fruits, ask him how they are alike, and show him the ones he missed. Then present a new set of pictures, this time with different objects. (Five animals; the other 5 should be a telephone, clock, car, soup, shirt.) Ask him to pick out the objects that are alike.

If the child cannot get started with the first set of pictures, show him the right objects and tell him what they are and how we use them. Then present the second set of 10 pictures. (Five animals and telephone, clock, car, soup, shirt). Ask, 'Pick out the things that are alike.'

Even if the child answers all questions correctly about the first set of pictures, be sure to present the next set (five animals). Ask the same questions as before.

Scoring of First Set: One point for identifying at least three objects in the class. An added one-half point for identifying each additional object. One point for naming the class (fruit, things we eat, foods). And one point for telling how the objects are alike (we eat them, they grow on plants).

Scoring of Second Set: One point for identifying at least three objects in the class. An added one-half point for identifying each additional object. One point for naming the class (animals). And one point for telling how the objects are alike (4 legs, heads, tails, etc.)." (p. B-7)

The oracy training was developed around the oracy pre-test items missed, and the teacher's judgment about who among the experimental students could use training in a given oracy skill.

Throughout the year, teacher aids were employed in the experimental classes. The aids administered pre- and post-tests. The teachers administered the oracy training.

Four classes were used: one first grade and three second grade, with 12 to 15 students per class. These students were selected by teachers as those who needed oracy training. Control groups were established from the same schools, with students drawn from comparable level classrooms.

Results of the pre-post testing are given in Table 2. In all cases the control groups scored higher on the pre-test than did the experimental groups. Analysis of covariance indicated significant differences in the experimental and control post-test scores, and an interaction with schools. Further analyses indicated no significant differences between experimental and control groups for the first grade and second grade #3. Thus, there was a fifty-fifty split in the effectiveness of the oracy training.

Melching and Whitmore indicate that much of the instructional materials for oracy training were available to control classes and may have been used. This may have reduced differences between experimental and control groups.

A further problem in understanding the present results is that the experimental classes used teacher's aids, while the control groups did not. Thus, if the differences between experimental and control groups in two of the second grades was "real", it may have been due to the extra "modeling" of language provided by the aids, rather than the ORTRAIN procedures. Whatever the case, this project demonstrates the difficulty of

Table 2

Results of Oracy Pre and Post Testing for
Students in the Oracy Training Project

		First Grade		Second Grade					
		1		2		3		4	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
Experimental	$\bar{X}$	36.9	47.4	47.8	66.0	51.5	68.0	40.7	52.2
	N	12		15		14		12	
Control	$\bar{X}$	40.5	49.0	48.5	52.3	55.7	59.1	46.2	54.2
	N	15		19		27		28	

translating concepts in the developmental model into operational educational practice. Perhaps approaches of a less "behavioristic" bent than ORTRAIN, oriented towards "immersion" and modeling techniques, beginning earlier and lasting longer are required to significantly impact upon oracy and then literacy skills.

Concepts from the Developmental Model of Auding and Reading Applied in an Adult Literacy Program

As a final illustration of how concepts from the developmental model of auding and reading have been used in program development, work on a functional literacy program for the U.S. Army will be discussed (Sticht, 1975-b).

In project FLIT (Functional Literacy) applications of the developmental model differed from previously discussed applications in that the relationships between auding and reading were not the focus of interest. Rather, the general concepts of *languaging* and *conceptualizing* provided conceptual guidance for the program development effort.

In FLIT, it was necessary to develop a literacy training program of no more than six weeks duration, for personnel reading below the 6th grade level. Altogether, there was approximately 100 hours of useful instructional time available.

Because the Army personnel in the FLIT program were supposed to be prepared to deal with Army materials, it was recognized that the appropriate cognitive content for dealing with such material had to be provided in the FLIT program. Thus, the program developed job-related, rather than "general literacy" materials.

The basic material in the FLIT Strand II program[1] consisted of 12 narrative prose passages, of about 300 words in length, each of which discussed a major knowledge area for six job fields: clerical, communications, cooks, mechanics, combat, and medic. These passages represent the cognitive content the students were to learn to conceptualize and language with.

That is, in the developmental model, it is stated that a person first develops a cognitive content, and then learns to express aspects of that data base to others via the languaging process underlying auding and speaking. Later on, the person in literate society will typically learn to represent his conceptualizations of his cognitive content for others in written form, and receive such representations from others. Essentially then, the person requires appropriate cognitive content, conceptualizing skills to think about that content, and modes of representing and receiving representations relevant to his conceptualizations and cognitive content. Speaking and writing offer alternative modes of representing conceptualizations, and auding and reading represent alternative modes of receiving representations of conceptualizations.

Following this framework, the FLIT program developed conceptualizing and languaging teaching activities to be performed using the core job knowledge passages.

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[1] Strand I provided direct practice in working with job reading materials and is not discussed here. See Sticht, 1975b.

The *languaging* component:

". . . deals with language at the level of the individual sentence. Within this broad scope, the focus may highlight different aspects of languaging at different times during the instruction. The three main focal areas are as follows:

(1) Focus on individual words. (Meanings of individual words.)

(2) Focus on individual words in relation to the total sentence. (The syntactical and semantic fit of a particular word or phrase in a particular sentence.)

(3) Focus on the total sentence and on the relationship of its parts to each other. (How the thought units in a sentence work together to build up the complete sentence.)

Although the languaging segment does not directly stress job knowledge, it does give the students job-related content. All the sentences used in the languaging segment are drawn from passages which present job knowledge.

The following points are stressed throughout the languaging instruction.

- Sentences are not made by stringing words together in a haphazard fashion.
- There are certain "rules" about choosing which words to use in a sentence and how to put those words together.
- The student already uses these "rules", or he would not be able to talk to others using sentences.
- When the student becomes more aware of these "rules", he does not need to guess or take a wild stab when he encounters a difficult sentence. He can use what he knows about a sentence to help him figure out the parts that he does not know.

The languaging segment introduces a new model of sentence structure. Why not use traditional grammatical models of structure? The reason is simple — traditional grammatical models of sentence structure can become quite complicated, much too complicated for marginal readers to master in a few weeks' time. The terminology is complex. Consider these few examples: direct object, indirect object, gerund, participle, predicate complement, prepositional

phrase, and dependent clause. The number of "rules" that must be mastered to use this system on a wide variety of sentences would be quite high. So we have constructed our own model of sentence structure — a model that is not a contradiction of traditional grammar, but rather, one that is based squarely on traditional grammatical structures. It is a "stripped-down" model designed to be simple enough to be learned by learning a small number of "rules", yet comprehensive enough to apply to most sentences which occur in Army training literature.

The structure and terminology of the languaging model is based largely on thought units and the kinds of information which each thought unit contributes to the complete idea expressed by the sentence. The most basic structure divides the sentence as follows:

The main idea can be separated into two thought units.

The Action thought unit in a sentence may be one of three kinds: Active, Passive, or Is-Ness. (The Action: Is-Ness corresponds to linking or copulative verb.) The thought units which tell more about the main idea may present six different kinds of information. Figure 3 presents the complete basic model of sentence structure." (pp 79-80)

The *conceptualizing* component of FLIT Strand II is based upon the idea that thoughts or conceptualizations can be represented in different ways. One mode of representation is the *linguistic* mode, using speech and writing. This mode has been the focus of the developmental model. Additionally, however, people are able to represent thoughts in pictures, or *iconic* displays. Finally, by combining linguistic and iconic modes of representations, special types of display, which are referred to as *schematics* in the FLIT program,

Figure 3. Basic model of sentence structure.

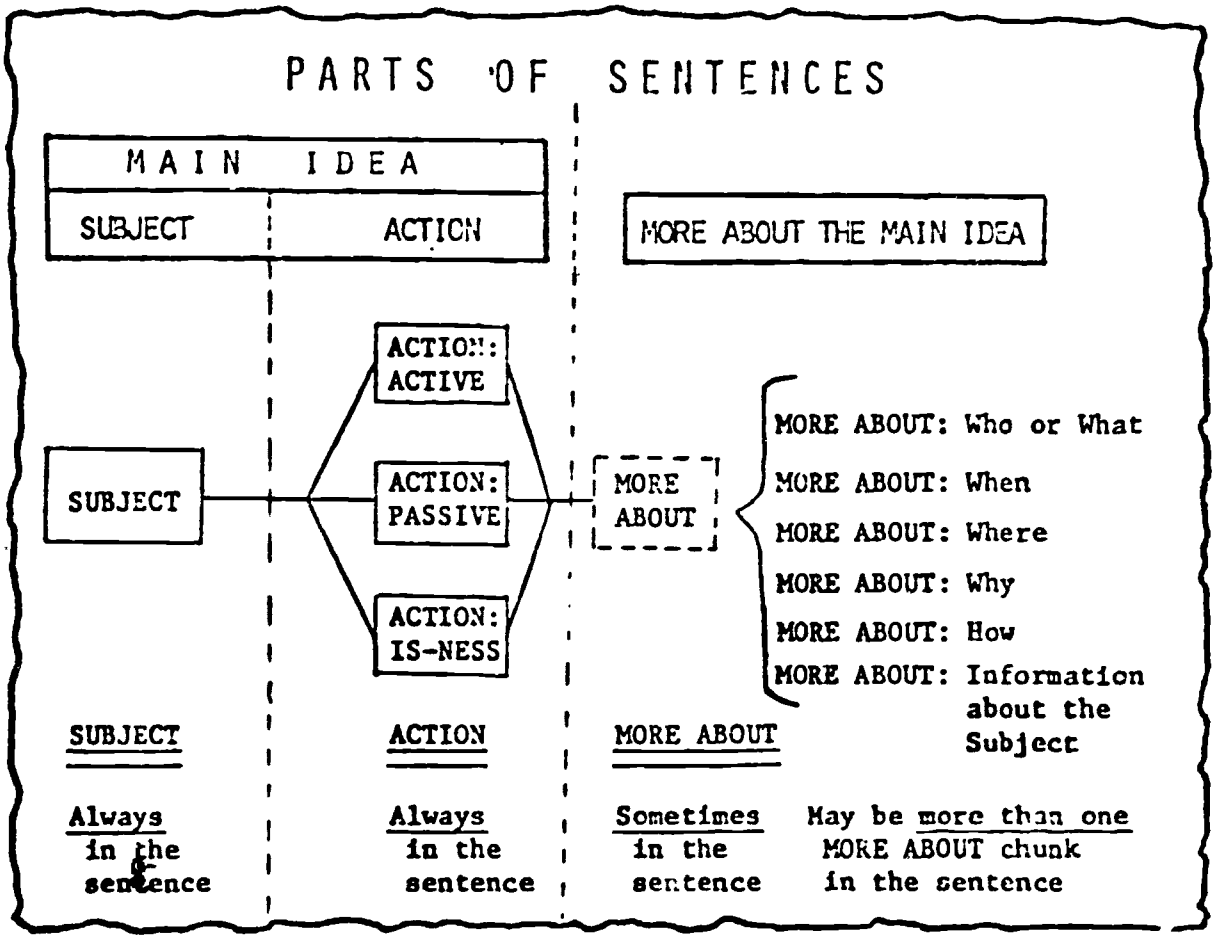


Figure 3. Basic Model of Sentence Structure

may represent conceptualizations. Such displays as flow charts, classification tables, graphs and the like are included in the *schematic* category.

In the FLIT program, students are taught to perform various transformations on the 12 core job-reading passages; such as reading the passage and then drawing a picture of what the total or a sub-part of the passage is about. In other cases, passages are converted into flow charts or classification tables.

Figure 4 illustrates the types of transformations involved in transforming *linguistic* representations in the form of written prose, into *schematic* representations in the form of a classification table (Figure 4A) and a flow chart (Figure 4B).

In teaching such transformations, teachers lead small group instruction in which the making of a particular type of representation transformation is demonstrated, guided practice is then provided, followed by practice on the 12 job-oriented passages.

Through this type of activity, the conceptualizing program focuses on (1) the development of increased reading comprehension skills through the teaching of various conceptualizing skills, and (2) gives direct instruction to increase job knowledge by using the specially prepared job reading passages as the vehicle for teaching and applying the conceptualizing/comprehension skills.

The summative evaluation of the FLIT program, including both Strands I and II, is accomplished through pre- and post-testing using the Metropolitan Achievement Test, Intermediate Battery (available in a military

version known as the United States Armed Forces Institute Intermediate Achievement Test — called the USAFI test here), and specially constructed Job Reading Task Tests (JRTT) made up of material from technical manuals and forms used in the military. For 714 students, entry USAFI scores changed from 5.3 to 6.0 for seven months gain in general literacy, while JRTT scores changed from 5.2 to 7.3 for 25 months of gain. In a comparison of a subset of FLIT students (n=149) with a group of Air Force (n=56) and Army (n=124) students in remedial reading programs not receiving job related reading, the FLIT students gained 21 months on the JRTT, while the Air Force and Army students gained 5 to 6 months (Sticht, 1975a, p.136). This indicates that the direct training using job related reading materials had a direct impact on the ability to read and use such materials. It further suggests that "general" literacy training of the very limited type typically provided in manpower training programs does not transfer as rapidly to performance of job reading tasks as does direct job-related reading training. In terms of the developmental model, this means that the cognitive content relevant to the tasks at hand must be developed, and that this can be done rather directly, as in the job related reading approach, or indirectly, as in general literacy training. It would seem that in order to develop a cognitive content with "network" enough to catch up job specific knowledges and reading skills through general literacy training, a long duration program would be required.

Figure 4. Linguistic to schematic transformation used in the FLIT Strand II conceptualizing component.

Types of Bars

Crowbars are used for moving timbers and rocks. They are available in 4 and 5 foot lengths with a diameter of 1 or 1-1/4 inches. Pinch bars are from 12 to 36 inches long and are used for prying out spikes and nails. Pinch bar diameters range from 1/2 to 1 inch depending on their length. Wrecking bars have diameters of 1/2 to 1-1/8 inches and are available in lengths from 12 to 60 inches. They are used for the same things as crowbars. Pry bars are used for prying out gears and bushings. They are 16 inches long and have a diameter of 1-1/16 inches.

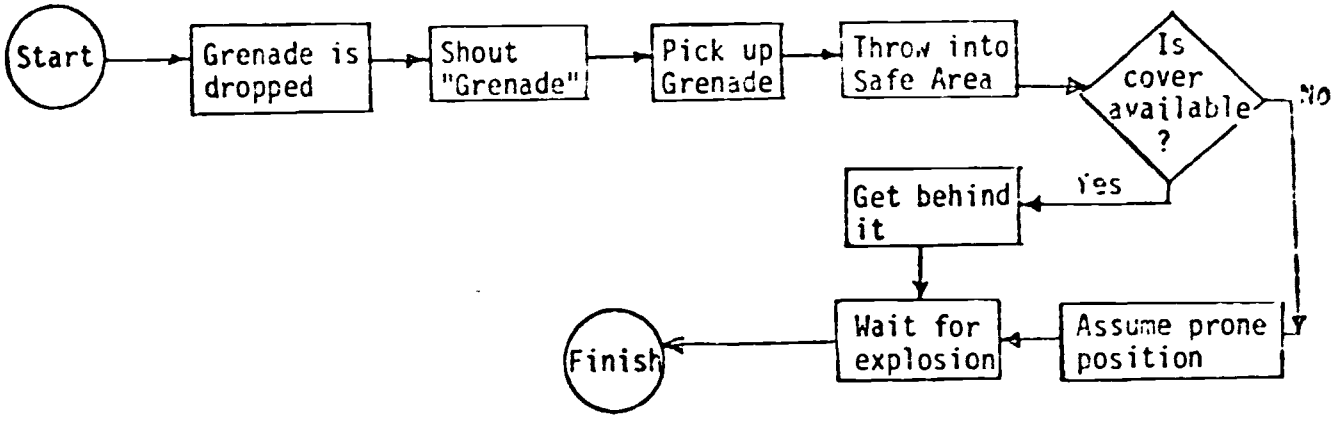
Type	Use	Length	Diameter
Crowbar	Moving timbers and rocks	4-5 feet	1 or 1-1/4 inches
Pinch bar	Prying out spikes and nails	12-36 inches	1/2 to 1 inch
Wrecking bar	Moving timbers and rocks	12-60 inches	1/2 to 1-1/8 inches
Pry bars	Prying out gears and bushings	16 inches	1-1/16 inches

A: Linguistic to Schematic (Classification Table) Transformation

Figure 4. Linguistic to Schematic Transformations Used in the FLIT Strand II Conceptualizing Component

When A Hand Grenade Is Dropped

When a hand grenade is dropped accidentally after the safety pin is removed, the individual will shout "Grenade". Then he picks up the grenade and throws it into a safe area. He should then get behind any available protective cover until after the grenade explodes. If no protective cover is available, he should assume the prone position until after the explosion.



B: Linguistic to Schematic (Flow Chart) Transformation

Figure 4. Linguistic to Schematic Transformations Used in the FLIT Strand II Conceptualizing Component (Continued)

Summary and Discussion

In this paper I have discussed a developmental model of auding and reading (the audread model) which maintains that reading develops upon a foundation of language skills acquired in the oral mode by auding and speaking information processing skills. This language skill is used to externally represent one's conceptualizations to others (speaking) and to internally represent the external representations of the conceptualizations others produce by speaking (auding). Reading utilizes the same language and conceptualizing skills and knowledges as used in auding.

Four projects based on the audread model were summarized:

1. A project to determine the extent to which first grade children learned to read the words they could speak.
2. A project to assess differences between auding and reading skills in adults.
3. A project to develop an instructional program to improve children's oracy skills.
4. A project of functional job-related literacy training for adults.

Study of these projects and the audread model to understand how the theory impacts on application, suggests that this is accomplished primarily in two ways:

1. It suggests important relationships to be studied and exploited for instruction; thus, projects 1 and 2 studied the closing of the oral language-written language "gap" in selected respects; while projects 3 and

4 attempted to produce instructional programs based on interrelations among language and cognitive components in the audread model.

2. It constrains certain decisions; for instance those relative to content of tests (e.g., use of first grade children's own stories so as to insure content within their knowledge base) or instruction (use of job-related reading materials to provide a conceptual base for comprehending job reading materials), and to sequence and modality of instruction (an oracy to literacy training sequence in project 3).

Neither the audread model nor, presumably, any other theory of reading processes or language can provide step-by-step procedures or generative rules for educational program development, because such development must operate under constraints other than those determined by the theory. Limits of time, money, human resources, and so forth will serve to turn the primrose path from theory to practice, into a Hampton Court maze where simply avoiding blind alleys may represent progress!

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FOOTNOTE

[1] Preparation of this paper has been supported in part by Air Force contract F41609-75-C0014 with the Air Force Human Resources Laboratory/Technical Training Division, Dr. James R. Burkett, Technical Monitor. Special thanks to Maurlaine Jorgenson for transforming my scrambled notes into an attractive manuscript.

OPEN DISCUSSION OF STICHT PRESENTATION

POSNER: Would it be evidence against your theory if you were to uncover situations in which a visual comprehension score, from reading, were to surpass the comprehension scores from auding, systematically?

STICHT: You are talking about quantities stored and retrieved, as contrasted with what has been comprehended. We're discussing types of qualitative differences, aren't we?

In your question, are you asking about a qualitative difference or a quantitative one in the sense of amount stored and retrieved?

POSNER: Suppose any dependent variable that you like, either amount stored and retrieved, or comprehension tests, or your last very interesting conceptual test where the guy puts out a better grenade-throwing sequence, any of those things.

STICHT: The latter he could not do by auding. The flow chart is one of those skills I mentioned which is an advanced type of literacy skill, which makes unique use of properties of print and does not go back to auding.

POSNER: You say you couldn't provide a person a paragraph orally, from which he could produce a flow diagram?

STICHT: Oh, he might. I should say this. it would be limited in its nature, as you know. At some point, you can't hold the information in your head.

I am saying that you would have to ----(?) unless you have given him a chance to write it down. Can he draw it? I am talking about being able to do it all in his head, and then just squirting it out to you as a flow chart. So those are difficult to do.

POSNER: There is no problem in your theory, although there might be a problem in your literacy score, if it turned out that, in a particular context, persons were much better if they got the material from reading than if they got it orally.

SMICHT: If they were able to store and retrieve more information from the printed display than from the spoken display, I would want to do a couple of things. I would want to look to see how well controlled were the display times. When we measure it here, you get no more time to read than you have to aud.

Ron Carver has just completed some studies, in which he has systematically controlled the rate of presentation of the printed page not just the speech this time (before he only controlled the rate of speech), this time again he has found that both auding and reading, for college students, have an optimal rate at around 250 to 300 words per minute. There is no difference in their overall effectiveness in storage and retrieval.

Now, in his case he measures amounts stored, in terms of three different types of tests, and they were all very highly correlated, but primarily he uses a judgment of "how much you understand" kind of measure, which is an interesting measure.

But it would be contrary, if given control displays, that you would find that the person could do better by reading than he could by auding, given again, control on the familiarity of the subject matter, and all of that stuff. It

would be contrary to the thesis, yes.

KINTSCH: I want to give another answer to Mike's question.

I don't think it would be contrary to the model because you can construct some positive examples where you expect the visual display to be better than your auditory display. For instance, I could just talk in a very sloppy way, chewing each word, with a big accent, and so on. You could construct tests in such a way that the ability that you have in reading, to go back and check, becomes very important. On the other hand, you can construct reading displays, as some people do in experimental work, where they present one word at a time, and you have sort of a stream coming down at you. This is hard to read. So I think you have to look at various factors and various situations before you could get evidence that the model is wrong.

STICHT: Yes. I and a lot of people think the question of interest is: Are there qualitative differences between comprehension by auding and reading? I think it is clear that there are, and I mentioned a couple of trivial ones in the paper. For example, the fact that you can detect the sex of the speaker, but it is hard to detect the sex of the writer, sometimes, in the written prose. But that gets you into the problem again: What is it you are trying to equate these with, at what level, and how do you want to test them? We have almost always tested the kind of semantic outcome from the morphemic or lexical kind of processing.

We have found cases where people stored more information by reading than they did by auding. In that case, though, we have almost never controlled the rate of presentation of the material; rather, we control the time of

presentation, to equate it with auding. And it is possible that we don't always present our auding material at a rate comparable to the rate at which people are processing print.

So they might go through a printed display in a survey style, a skimming kind of style, and then go back and read some more. So they might actually make themselves process the print more than they would process the spoken language.

GOODMAN: Tom, may I ask first whether I understand something? You do at the end, at these various stages, talk about special uses of written language, where you don't have oracy methods, but in the beginning, basically, it's the same test, both orally and written; the reading and the listening tests are the same?

STICHT: The thought is that in the beginning, yes, the task is for the child to use the printed language as a substitute for the oral language, and in fact they probably have been.

GOODMAN: The issue I want to raise then is whether, in fact, even at the beginning there aren't different functions for written and oral language, and whether, in fact, by comparing the child's understanding of the same thing, presented through listening and reading, you are getting at his ability to process oral language in other kinds of situations, conversational ones, those that don't involve listening to somebody tell you something, and then trying to tell it back, which is more a school kind of test, which I agree schools focus on in reading. What I am saying in a sense is that both the listening and reading, then, are within a single more intellectual, more academic kind of function than the functions that are most represented in young children's oral language.

STICHT: Yes. I guess what we would conclude from that is that somehow they still must learn to comprehend that printed stuff, using the same language and conceptual basis they use to comprehend the spoken stuff, regardless of the fact that the printed stuff may be in a more highly stylized form.

GOODMAN: In designing your rather huge project, you apparently got differences among the kids, in terms of their listening ability. Can it be a spurious thing, and maybe simply a kind of orientation toward the kind of content, rather than the language tests?

STICHT: I am not sure.

GOODMAN: The ability to deal with the kinds of things that they were being asked, rather than--

STICHT: Oh, let me point out that those data I showed from that project called ORTRAIN, or oracy training, were for oracy tests, not literacy tests. They did not go ahead and check to determine the consequences of oracy training on literacy skills. Those were tests, very complex kinds of tests in some cases, probably more complex than justified by the training, as a matter of fact.

RESNICK: Ken, what would you predict the differences to be if one were to use oral materials more typical of actual speech?

GOODMAN: Well, tomorrow I am going to talk about Halliday's different functions of language, and their interrelationships. And one of the things that I think may be a key mistake we have been making is to use the function of language, the

informational one, which Halliday considers to be the seventh and most advanced and the one that adults always refer to as the use of language, instead of dealing with those things that are much more functional to children and much more a part of their everyday ongoing life. You get a distortion, then, of their oral ability, because you are staying with a task which is one that they don't have much experience with yet or use much. I think if you could get to some of the more immediate kinds of things that kids are "into," then you show more ability.

STICHT: I tried carefully to point out that we had not in any of this attempted to get what might be called a representative measure of the child's auding competence, and then find out whether or not he has developed that competence by reading. Rather, we went to the point of saying when is it that they can read some stuff? And if they can't do it so well by reading, can they do it any better by auding? And then, how does that gap close? Part of the reason for going to that, Ken, was directly the problem you mentioned in trying to develop a power test of oracy skill.

Now, in Gay Keithly's study, she actually had children tell their stories; then we construed that as being in the children's vernacular, in their cognitive context. When you type those stories up, you have a very nice approach, particularly well mapped onto the language experience approach, and it kind of formalizes the measurement procedure. Let's say it could be either a formative or a summative measure, and with sufficient numbers, it would be "normable" and even "criterion-referenceable."

GOODMAN: The interesting thing, that is kind of ironic, is that there is a lot of attention being given to getting some measure of oral language ability as a basis for putting kids into bilingual programs.

Roger and I were at a conference, and there is a good deal--if Jeanne doesn't mind my borrowing her term--of bumbling going on in bilingual work because people haven't even begun to look at the issues.

It is interesting that we want something quick and fast and powerful, without making ourselves look at what is involved in doing it.

STICHT: Well, I did mention it to the people at Defense Language Institute once. They were interested, but one of their problems is that they have to build foreign language competence tests, and they found that at times the content they had to give was possibly not appropriate; that is, the person couldn't have performed the task in his own language. I suggested then, following this developmental model, what you want to do in this case is talk about closing the native language-foreign language gap.

You would always want a parallel set of passages given in the native language and the foreign language. The native language tells you whether they can perform a task or item of this content in their own language. If they can't, it is ridiculous to ask them to perform it in the foreign language. In that way when they fail the foreign language test, you may have some reason for understanding why, although failure is always, as you know, ambiguous. The best thing is to find something they can do, than simply find out why.

CHALL: Tom, I really don't know if I got all of the information from the charts, or even if I am correct, and so I will ask a question and then also ask to be corrected. Are you saying that in all of your researches, and also in Ron Carver's, the reading doesn't go beyond oracy?

STICHT: I am saying that when you control the rate of presentation of the materials, the optimum rate is the same.

CHALL: In other words, Fries, whom you quoted in such detail, is wrong in his description of stage three. He said stage three is the stage in which the written form goes beyond the oral form in efficiency.

STICHT: No, no. He says that the third stage begins when the reading process itself becomes so automatic that the reading is used equally with, or even more than, live language.

CHALL: So, in other words, you have found only "equal to," but never "more than?"

STICHT: No, no, no. Let me point out a distinction here. The distinction is the extent to which you wish to use these modalities for the acquisition of information. The schooling process forces most of us to read.

CHALL: Let me admit that, to me, reading is more efficient than listening, because listening moves too slowly for me. I can cover more ground by reading and get more information.

Your data, it seems to me, go contrary to most of the data that I have up to that point, but I haven't seen all of your data. I have accepted that it made sense. The best example of it is the dissertation that was done at Teachers College, Columbia, by Goldstein, who compared oral with written language comprehension. The results show that up to a certain point you start off with oracy ahead of literacy. Then literacy catches up, and then goes beyond oracy.

STICHT: No, the Goldstein data are given here under hypothesis three. Goldstein found that for the speech rates of 100, 137, 174, 211, 248, 285 and 322 words per minute, comprehension scores for reading decreased as follows: 10.8, 10.1, 10.1, 9.8, 9.4, 9.1, and 8.7. These were equivalent to the auding scores. There were no differences.

CHALL: There were no differences in auding?

STICHT: No.

CHALL: Even in the brighter people, the better readers?

STICHT: No. The scores for the others were 11.1, 10.8, 10.6, 10.5, 9.4, 9.3 and 8.7.

CHALL: Then I am mistaken, because I was under the impression that there was a difference for these superior readers.

STICHT: Well, I don't recall his breakout by low, medium, and high scorers.

VENEZKY: Goldstein found two variables to be important: complexity of materials and IQ. He found that for higher IQ subjects and more complex materials, reading is far superior to listening.

CHALL: Okay. In other words, then, Tom has stopped with a certain level.

STICHT: I prefaced the whole thing by indicating that this is a model oriented

towards the typical case. I think I said that, didn't I?

CHALL: Typical in the army, you mean.

STICHT: No, it's for the typical case, the average type of reader.

CHALL: Well, that's hard, because we have average college freshmen at Harvard, you know.

STICHT: But we don't have average information processors at Harvard, you see. You can find people who will do a lot of skimming and scanning and conceptualizing and invention and creating about what is on that printed page, without even reading it. And the better you develop your language skills, the better you are at doing that. Jeanne, you know the eye movement studies show that you don't get the same type of processing with so-called rapid readers.

CHALL: Tom, all I am proposing is that, perhaps, if we include the extremely skillful people, it might give us some understanding of the typical

STICHT: Ron Carver used four different levels of difficu. ty. He broke it out by aptitude levels and did a better controlled study, and there still is no difference.

DANKS: It seems to me that overall comparisons between auding and reading are impossible, and probably inappropriate, to make. In response to Mike Posner's question about what happens if you find cases where reading is better than auding, the replies were in terms of experimental control factors--controlling

the display, the decoding rate, and then conceptual factors. If we are sufficiently clever, we can set up situations in which the relative performance levels auding and reading can go either way. If so, what is controlled, and what is equivalent?

The only way we know when something is equivalent is when our data tell us that they are equivalent. So if the data do not indicate equivalency, then we can adjust the stimulus, the rate, and the material, to make them equivalent. What we should be doing is an analytical analysis of the tasks and of the readers and listeners, rather than trying to make global comparisons.

STICHT: In response to that I would say that in doing this kind of thing, we were trying initially to keep kind of a developmental perspective. It is one thing to make the model about the period of time over which the person learns to be able to perform with print as accurately and efficiently as he can, say, with an information storage-retrieval task with speech. To say the subject can go beyond that might, in fact, be the case. Then one would be left to explain that. And I am all for that.

VENEZKY: Tom, when you made the rather obvious statement that we wouldn't want somebody trying to comprehend in the second language something he couldn't comprehend in his first language, it occurred to me that the function of a conference like this is to make sure everybody walks away doubting even the most obvious. But I feel compelled to remind you of something written a few years ago by the late James Thurber, who describes an author telling a young admiring miss at a cocktail party that he has most of his short stories translated into French because they lose so much in the original.

The next paper "Coding and Comprehension in Skilled Reading and Implications for Reading Instruction" by Charles A. Perfetti and Alan M. Lesgold is in the ERIC system as a report from the Learning Research and Development Center, ED145399.