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# **American Reading Forum Online Yearbook**

## **Volume I, 1981**

### **Comprehension: Process and Product**

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### Comprehension: Process and Product

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*Invited Address  
First General Session*

## TOWARD UNDERSTANDING COMPREHENSION

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Reading educators' traditional alternative for improving students' reading comprehension have been to (a) modify the text, (b) augment the text, or (c) modify the students' reading behavior. Each alternative has been the subject of considerable study and each one can be briefly characterized.

Most efforts to improve comprehension by modifying the text have been heavily influenced by the literature on readability. Consequently these efforts have relied on such practices as limiting the average number of words per sentence, substituting easy (i.e., short, frequently occurring) words for hard (i.e., long, technical) words, and modifying sentence structures, usually by making them more like age-peers' oral sentences or by shortening or otherwise simplifying base clauses. The results have not been particularly encouraging because readability—and comprehensibility—depend on a much more complex array of factors than sentence length, word frequency, and sentence structure.

Effective or not, making basic changes in the text can be both costly and unrealistic. Rewriting text is costly in terms of the time required. But even putting that consideration aside, one wonders whether rewriting text accomplishes much in helping students cope with real-life reading tasks. Perhaps a better way is to augment the text through the use of adjunct aids like advance organizers, objectives and questions. Adjunct aids can be characterized as orienting directions which dispose the reader to respond actively to certain aspects of the text. In general, the most commonly used adjunct aids—advance organizers, objectives and questions—can be quite effective in helping readers improve their comprehension scores. To oversimplify, then, studies show more positive results from augmented than for modified text. Perhaps this is partly because the adjunct aids do indeed involve the reader as an active participant, whereas modified text does little to change the readers' role. At the same time, there is evidence that the improvement in comprehension scores is caused by items related to the focus of the adjunct aids, not increased global "understanding" of the text. Also on the negative side, the provision of adjunct aids is teacher-directed, so students may never internalize the orienting activities sufficiently to become self-directing. Providing adjunct aids can be like providing crutches without effecting cures.

Attempts to improve comprehension by modifying students' reading behaviors do shift the emphasis from teacher-directed to student-directed activities. The more frequently encouraged activities include imaging, paraphrasing, and traditional study skills like underlining, summarizing, note-taking and outlining. Studies have demonstrated positive effects for each of these activities; but, in general, the positive effects have been found with older (i.e., high school and college) students who have above-average ability. On the positive side, such activities do indeed involve students in their own learning and offer the potential of being internalized. On the negative—or perhaps more properly, the realistic—side, the activities typically provide very little by way of developing readers' ability to deal with the structure of text. Because many of the activities require the reader to perceive the organizational structure of the text in order to proceed effectively, poor readers—the ones who need help the most—are helped the least.

Reading educators' traditional alternatives share a common flaw: their focus is too limited. Emphasis is placed either on the text, on the teacher (i.e., teacher-directed activities), or on the reader (i.e., reader-imposed behaviors or strategies); and there is little inclination to pay attention to the interactions among all three. Yet the clear message of the literature, the expressed concerns of teachers, and our own observations and common sense is that attempts to improve readers' comprehension of text must have concurrent regard for the text, the teacher—for the entire instructional milieu—and the reader. To have optimal effect, then, an effective instructional technique ought to give concurrent consideration to the background, abilities and short- and long-term needs of the reader; the expectations of the teacher; the resources of the instructional milieu; and the characteristics (i.e., facts, concepts, structure, organization) of the text. In other words,

to have optimal effect the teaching technique would bring together the diverse aspects of a complex teaching-learning process. And, lest we forget, the technique would also embody the most promising implications of a vast and expanding body of related research.

*This may be the place to confess that the title of this paper—"Toward Understanding Comprehension"—does not describe its focus. What I've been talking about, and what I'll continue to talk about, is not the thrust of or the need for research on the nature of comprehension. (The research on comprehension may already say more about comprehension than any person sincerely interested in reading education can understand.) What I really mean to be talking about is how we, as reading educators can discover ways to help learners not only to improve their comprehension of printed material but also, and more important, to improve their ability to comprehend. A more proper title, then, might be something like "Understanding Toward Comprehension."*

*My problem with the title may be related to a dilemma I see us facing in reading education. Should the main role of a reading educator be to conduct or to interpret research? And, if the latter, then what does adequate interpretation amount to? But more about that later.*

There is indeed an extensive and rapidly expanding body of research that appears relevant to reading educator's efforts to enhance readers' ability to understand reading material. Just as an example I can point out three categories of studies that appear to promise much to reading education. All of the studies cited were conducted and reported by people who, I am confident, would not claim to be "reading educators" in the conventional sense. (In fact, I suspect that most, or all, of them might take offense at being called reading educators, noblesse oblige notwithstanding.) The categories can be characterized as follows:

- (1). The Reader—where the focus is on the prior knowledge and knowledge structures of readers. Some investigators have been paying particular attention to readers' cognitive development (for example, Smirnov, 1973; Brown, 1975, 1977, 1979; Chi, 1978; Naus & Halasz, 1979) and to readers' use of prior knowledge, or schemata (for example, Norman, Genter, & Stevens, 1977; Anderson, Reynolds, Schallert, & Goetz, 1977; Rummelhart & Ortony, 1977; Kintsch, 1979; Rummelhart, in press) in order to better understand the personal characteristics that are involved in effective comprehension.
- (2). The Text—where the focus is on the attributes of printed material. A number of investigators have been working with the analysis of text (for example, Kintsch, 1974; Meyer, 1975, 1979) and the adaptation of text (for example, Frase, 1972, 1975; Rothkopf, 1976; Rickards & Hatcher, 1978) in order to better understand the characteristics of text and textual modification as parameters of comprehension.
- (3). The Interaction of Reader with Text—where the focus is on the point of interaction between reader and printed material. Investigators have been examining readers' metacognitive

development (for example, Brown, 1977, in press; Flavell, in press; Markman, in press; Baker, 1979), the development of study skills and learning strategies (for example, Anderson, 1978, in press; Brown, in press; Andre & Anderson, 1978), and the effects of schooling (for example, Olson, 1977a, 1977b; Cole, 1977; Meacham, 1977; Scribner, 1979) as they come to grips with the inescapable fact that reading comprehension is a product of both reader and text.

Taken together, these and related studies offer a rich—but largely untapped, in any systematic, integrative sense—reservoir of facts, implications, and direction for developing instructional procedures designed to enhance learning from text. I should like to suggest that it is up to reading educators to provide the systematization and integration that precedes application in the classroom and in the real world. If reading educators do not do it, nobody will.

Now please do not misunderstand. I know the challenge is an old one. For at least a millenium we educators have been lamenting the gap between "research" and "application." But generally the lamenting has been about as sincere as the wailing of paid mourners. The realities of the tenure system and the folkways of the craft effectively force a choice of *research or practice. There is virtually no incentive and consequently, very little inclination to make an earnest commitment to translating research results into instructional practice. Those who choose not to make a clear choice are likely to develop a schizoid style: one set of behaviors in the company of researchers and another, essentially unrelated set of behaviors in the company of practitioners. But the stark fact is that it is very difficult to live with one foot in each camp and virtually impossible to exist in the no-man's land between them.*

*This is the time for another confession: I'm not sure I see a way out of the dilemma. In the manner of academicians, I find it easier to acknowledge problems than to come up with solutions. But in the manner of schizophrenics, I'm willing to share an experience. Just let it be clear that I'm sharing an experience; I'm not offering a solution—and I'm certainly not giving advice.*

In our attempt to act as facilitators, my associates and I settled on the notion of developing an instructional technique that we hope will help to improve comprehension—not just what we know about comprehending. We described our purpose in an article for *Reading Psychology* (Otto, White & Camperell, 1980): "... on the basis of our observations in the field, our fantasies of how things could be, and our present perceptions of the related research, we have begun to develop procedures for *glossing* expository text. To oversimplify, we are using marginal and other intratext notations—gloss—to direct readers' attention while they read. Instead of relying on traditional adjunct aids like questions or advance organizers, we are attempting to direct readers' active attention to places in text where the application of specific skills would be appropriate (this could be for the purpose either of teaching or of encouraging the application of specific skills), to instances where a particular strategy could be useful for extracting meaning, and to key words and ideas. In other words, we are attempting to share mature readers' perceptions of and insights into the reading process with developing readers. We expect to make use of a wide range of techniques and activities, including traditional adjunct aids and study strategies. What we hope to do is to systematize our glossing procedures so they can be used with confidence, both formally, in the preparation of instructional materials, and informally, in face-to-face teaching in the classroom."

Recently, in the course of our work, we had occasion to prepare a position statement. While it won't tell you much about the specifics of glossing, I hope it does tell you

something about where we're coming from and where we're headed. This is it:

As we view the present scene, there is, on the one hand, a clearly recognized need for techniques that teachers can use to help students understand content-area texts; and, on the other hand, an extensive and rapidly expanding body of research and theory that promises to yield facts, implications and directions for developing the needed instructional techniques. The work we are proposing—development of a glossing technique—places us squarely in the middle, for we expect to seek implications for application in the existing research and theory as we develop the technique. We think that the middle is a viable position for teacher educators, for it provides opportunities to build much needed bridges.

We are, then, committed to the middle position, where we attempt to expedite the translation of research and theory to classroom application. This commitment is the basis for four decisions which, in turn, shape the planning of our work.

First, our approach to developing the glossing technique is *eclectic*. (We would even go so far as to say it is, at least at this early stage, deliberately *atheoretical*.) In other words we are not attempting to develop the glossing technique in line with a particular theoretical position—or to extend any particular line of research. To the contrary, this eclectic stance leads us to seek implications from an array of relevant, or seemingly relevant work. For the moment we are confining our search to promising areas of cognitive psychology—schema theory, memory development, text analysis, adjunct aids, metacognition, study strategies and text processing. We readily acknowledge the relevance and promise of other areas—sociolinguistics is a prime example. But even as we restrain ourselves from wild grabbing, we do not claim expertise, as teacher educators, in such an array of subareas of cognitive psychology. Hence, last month we hosted a conference on *Reading Expository Text*. The conference was one attempt to extend our personal perceptions in a systematic way by seeking the insights of qualified others. We expect to continue to seek the advice and criticism of specialized scholars.

Second, the glossing technique is deliberately "global" in nature. That is, the technique subsumes a variety of activities that address such diverse things as (a) development and/or application of specific skills and strategies, (b) the amplification or clarification of content, and (c) the internalization of skills and strategies. Of course "global gloss" is messy, both when it comes to specifying exactly what gloss is or how to gloss a text and when it comes to designing studies that show exactly which activities do or do not enhance which readers' ability to understand expository text. But if gloss is to embody the integrative feature we are seeking, it must necessarily address, simultaneously, (a) the techniques and strategies involved in the reading process, (b) characteristics of a given text, and (c) the facts and concepts of a given content. Once we can reliably put together gloss that "works" (i.e., enhances understanding of text) with identifiable individuals or groups, then we can devise studies to find out why it works.

In other words, we think that for now it is important to *synthesize*, to take what common sense and informed analysis hold to be promising and intuitively devise a technique that is credible and useful to both teachers and students. Once we have that we will *analyze* to find out what works best and with whom.

Third, we expect to develop two sets of guidelines for glossing expository materials: *guidelines for informal glossing*, which teachers can use on a day-to-day basis with the textbooks in their content-area classrooms, and *guidelines for formal glossing*, which we can use to develop prototype materials for demonstration, instruction and study. We expect the two sets to be similar in intent and substance; but, at the same time, they will differ in detail and application.

Ultimately, teachers need guidelines that they can use informally to help students understand content-area texts. Consequently, we want to describe the glossing technique (or, probably more properly, *techniques* for glossing, for we expect that certain specific techniques will be more effective with certain individuals and groups) in terms that teachers can use informally to gloss content-area texts. Of course such guidelines will not, and should not, give the definitive direction of, say, a set of specifications for creating a computer program. They should, however, be a melding of such things as (a) facts about the skill and strategy aspects of gloss that work best and with whom (e.g., that activities which focus on application of specific skills are most helpful to poor comprehenders; that activities which focus on inference-points in a text are most useful to readers who have a good background of related content knowledge), (b) practical procedures for analyzing and dealing with characteristics of text (e.g., organization; concept-load), (c) consideration for students' background knowledge related to a given text, and (d) sensitivity to the need for helping

students move toward internalization of the skills and strategies that are demonstrated and developed through glossing. In other words, we look toward a set of guidelines for teachers that is rooted in facts and tempered by feelings that come from an awareness of situational constraints and considerations.

Concurrent with the development of guidelines for teachers, we expect to develop prototype gloss for demonstration and study. This means that we must develop more formal guidelines for glossing materials. Such guidelines should also be useful to publishers, both in preparing adjunct materials for content-area text and in preparing instructional materials designed to improve students' general skills and strategies for understanding expository texts. The goal we set for "formal gloss," insofar as its instructional applications are concerned, is to help readers move from a stage where they rely on gloss to assist their understanding to a stage where the skills, strategies and insights they have acquired are internalized and self-sustaining. In other words, *formal gloss* should go beyond "providing crutches"—which is the case with most adjunct aids, and text modifications—to "effecting cures" (i.e., not merely improving comprehension, but improving readers' ability to comprehend).

That is what we said. We put ourselves in that vast and formidable no-man's land between research and practice. And, in effect, (you can judge whether in folly), we said that we would attempt to act as mediators, giving attention to some finite yet significant set of implications from the research side and to some clearly perceived and significant set of concerns on the practice side. A cynic might say that we put ourselves in an extremely vulnerable position, inviting potshots from both sides! On the other hand, one might say that we put ourselves in exactly the right position, as teacher educators, to perform a most vital and useful function.

To this point I've claimed to be behaving in the manner of academicians and of schizophrenics. You may judge the redundancy of those claims. But now let me *disclaim* acting in the manner of a first-general-session speaker, for I will offer neither conclusions nor summary. I choose to believe that we're here for the first of many meetings of the American Reading Forum because we want to engage in open-minded—and, at least some of the time, open-ended—discussion of issues related to reading education. I've tried to share with you some of the issues as I see them. I'm looking forward to the discussion.

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## ASSESSMENT OF COMPREHENSION BY STANDARDIZED, NORM-REFERENCED TESTS

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Standardized, norm-referenced tests are prominent parts of most evaluation programs used to assess progress in reading. Though results are used along with other data about student progress, scores on standardized, norm-referenced tests are highlighted in discussions about reading progress. Some federal programs in the past have mandated that these tests be a major part of program evaluation. Reports of reading progress—or lack of progress—of states and school systems published in newspapers and periodicals usually are based upon results of these tests. Farr, Tuinman, and Rows (1974) and Harnischfeger and Wiley (1976) concluded that reading achievement has either decreased gradually or leveled off. More recently, Farr, Fay, and Negley (1978) reported that students in one state were reading better in 1976 than students of comparable grades 30 years earlier when adjustments were made for age differences. Cooperman (1978), on the other hand, criticized the effectiveness of reading instruction. All of these—and many other studies—utilized data gathered from use of standardized, norm-referenced tests.

An implication that can be drawn from a closer look at data on reading achievement trends is that a more effective job likely is being done in teaching word recognition skills than in teaching comprehension (Aaron, 1978). A recent study by Durkin (1979) contends that very little teaching time is being devoted to reading comprehension. Although Durkin's findings may or may not be typical of teachers as a whole, comprehension is what reading is all about, and that is why the focus of this study is on comprehension.

Information about comprehension tests should be useful to evaluators, teachers, researchers, and administrators. Test users need to know what tests measure and how they measure it. Further, a comparison of tests will provide more insight into why results obtained from different publishers' tests differ. A study of test items will also help users compare skills assessed by tests with skills taught in basal materials used in their own schools or systems. This latter area of concern becomes more important in view of the current practice of using some standardized, norm-referenced tests as if they were criterion-referenced tests. Lastly, agreement on exactly what make up comprehension is hard to come by, but whatever it is, everybody believes in it.

## Purposes of the Study

This study aimed toward learning more about how reading comprehension is assessed by five widely-used standardized, norm-referenced tests of reading comprehension. The five tests examined were the *California Achievement Test* (CAT), Levels 12-19 (1977); *Gates-MacGinitie Reading Tests* (G-M), Levels C-F (1978); *Iowa Test of Basic Skills* (ITBS), Levels 7-14 (1978); *Metropolitan Achievement Test* (MAT), Levels Primary II-Advanced II (1978); and the *Stanford Achievement Test* (Stan), Levels Primary II — Advanced (1973). Specific purposes were to analyze the passages and items on the comprehension subtests of the five selected tests in terms of the discourse form (narrative, expository, descriptive, and argumentation) of the passages on which the items were based, the comprehension level assessed (literal, inferential, and evaluative), the comprehension skills assessed, the estimated readability of each passage, and the length of the passages on which the items were based. In addition, the investigators made inter-test comparisons on each of the aforementioned points at the fourth and eighth grade levels.

The *Anchor Test Study* (1974) was carried out because it was recognized that widely used standardized, norm-referenced tests differed considerably in measuring units and in what they measured. This project established interchangeable norms among eight widely used tests so users could pretest with one test and posttest with another publisher's test. However, since 1974, all eight tests examined during the *Anchor Test Study* have been substantially revised.

In the present study, the focus is placed on the latest versions of the reading subtests that assess comprehension in five of the eight standardized, norm-referenced tests used in the *Anchor Test Study*. All of these tests also assess decoding skills and meaning vocabulary; however, no effort was made to examine any subtests other than those assessing comprehension. The researchers recognize the importance of the other subtests, but they were most interested in comprehension for reasons previously mentioned.

## Procedures

Throughout the examination of the comprehension subtests of the five standardized, norm-referenced tests, the two researchers worked independently of each other in classifying each selection and/or item in terms of discourse form, comprehension level, comprehension skill being assessed and length of selection. Then meetings were held to compare findings and arbitrate differences where necessary.

## Discourse Form

The selections were categorized initially into the two broad categories of poetry or prose. Then all selections were categorized into the four traditional forms of narration, exposition, description, and argumentation. The usual definition of discourse form were used as guides (Shaw, 1972; IRA, at press). Often, discourse is a mixture of several forms, but usually one form predominates. In this study the two researchers were able to agree on all passage classifications.

The five tests examined vary widely in amount of the four forms of discourse. Only three of the five tests use poetry and it accounts for a very small number of the passages and items. Four of the tests have few, if any, argumentation passages. Inter-test comparisons at a single level reveal considerable differences in amount of the forms of discourse. Generally, all of the tests, except the *California Achievement Test*, rely most heavily on narrative and expository passages for assessing reading comprehension. Refer to Table 1 for a

complete summary of the percentages of discourse forms found within each test. Poetry, which is presented in a separate column, also is included in the *Description* column.

### Levels of Comprehension

All items were classified in terms of level of comprehension: literal, inferential, or evaluative. An uncomplicated, straightforward classification scheme was employed. If an item could be answered from information directly stated in the passage, it was considered to be literal. It was deemed unnecessary that the answer be stated in the exact words of the stem and appropriate completion, but it had to be answered clearly in the discourse without requiring use of inference. Inferential items were those in which answers were not explicitly stated in the passage and where evaluation was not involved. In inference, the basis for the answer, all facts needed to determine the correct answer, might be presented in the passage, but to reach the answer the reader must fill in gaps from experience or according to logic. An evaluation item was one in which the reader's judgment was involved.

The classification scheme used in this analysis is different somewhat from existing taxonomies such as the widely followed taxonomy of Barrett (1976). For example, Barrett's taxonomy has a fourth category labeled "appreciation." Further, Barrett's taxonomy includes recall of main ideas and sequence under literally recognition as well as under inferential. As Pearson and Johnson (1978) point out, main ideas are seldom literal; they must be implied. Similarly, sequence must be inferred unless events or actions are prefaced by words indicating order of occurrences, as "first," "next," or "last."

The five tests utilized in the study vary considerably in how they categorize items, though all tests use the categories of literal and inferential. The *California Achievement Test* uses literal comprehension, interpretative comprehension, and critical comprehension; the *Gates-MacGinitie* includes only literal and inferential items; the three categories of the *Iowa Tests of Basic Skills* are literal meaning (facts), interpretative meaning (inferences), and evaluative meaning (generalizations); the six-way breakdown of the *Metropolitan Achievement Test* includes vocabulary, literal-specific, literal-global, inferential-specific, inferential-global, and evaluation; and the *Stanford Achievement Test* divides items into global meaning, explicit meaning, implicit meaning, meaning determined by context, and inferential meaning. The categories used in this study most closely match those of the *ITBS*, but the subcategories differ somewhat. For example, main idea and figurative language are listed as evaluative meaning rather than as inferential in the *ITBS*.

Within the levels of a given test, the percentages of literal, inferential, and evaluative items vary widely and appear to follow no particular pattern. Inter-test comparisons reveal considerable differences in percentages of literal and implied items, and only one test gave any substantial attention to evaluation items. The most striking feature, in terms of the levels of comprehension assessed, is that at most levels inferential items far outnumber literal test items. See Table 1 for a breakdown, by test, of the number of items and percentage of items that were at the various levels of comprehension.

### Classification of Skills

Currently available materials designed for use in reading instruction and evaluation are, for the most part, based on a skills approach to comprehension. Almost without exception, basal reader series and other published instructional materials, knowingly or unknowingly, are built around the

idea that comprehension is made up of skills and abilities, rather than being global or unitary in nature. The same can be said about standardized reading tests and the approaches presented in reading methodology texts.

Classifying test items in terms of the comprehension skill assessed may appear to be a simple task. However, the task is far from simple on some types of items. An item may involve more than one skill, as drawing a conclusion and cause and effect relationship or vocabulary and figurative language. Further, all items could be classified as identifying main ideas or details. Therefore, some hierarchical pattern must be established when undertaking a categorization task of this nature.

In the present study, the researchers, working separately, classified each item on all levels of all subtests into one of nine categories (see Table 2 for the nine categories utilized). Then results were compared and any differences were arbitrated. Occasionally, items were found which tapped more than a single skill, as character's feeling and drawing a conclusion. Such items were classified under the skill that appeared to be the focus of the item. If an item assessed a skill like character's feeling or cause-effect relationship which could be answered only by drawing a conclusion, then the item was categorized under the skill other than drawing a conclusion. Any item classified as detail was an item involving something other than a main idea and one that did not fit any other skill category.

With regard to the comprehension skill assessed, only a few comprehension subskills are sampled within a given level of a test. In fact, many reading comprehension subskills taught in basal readers are not assessed in any of the five tests. A comparison of the five tests reveals an emphasis by three of the tests on detail, main idea, and cause-effect items. Four of the five tests have the vast majority of their items falling into these three subskill categories plus drawing conclusions. Only one test reveals a spread across the nine comprehension subskill categories. See Table 2 for the percentages of subskills assessed by items on the five tests.

### Readability of Passages

Besides investigating discourse form and the levels and skills of comprehension assessed by the five standardized, norm-referenced tests, the researchers investigated the difficulty of the passages upon which the test items were based. Specifically, passage length, sentence length, item density, and readability estimates were studied.

Three readability formulas were utilized to obtain estimates of passage difficulty. The Harris-Jacobsen Readability Formula (1975) was used for test levels designed for third grade or below. This formula was utilized at the primary levels of the five tests because it provides specific grade levels and subdivisions of each grade level through the third grade (i.e., preprimer, primer, first reader). The Fry Readability Graph (1968) was used for test levels at or above the fourth grade. The Dale-Chall Readability Formula (1948) was utilized to spot-check results of the Fry Graph when grade levels obtained were three or more grade levels above or below the test audience. In the case of the Fry Readability Graph, as many 100 word samples as possible were used to obtain an overall passage readability level. For example, a 526 word passage's readability level was based on five 100 word samples.

Readability estimates reveal that readability levels of selections within a test vary widely and follow no particular arrangement in terms of a progression of difficulty. In addition, readability estimates vary among the five tests at comparable difficulty levels. Table 3, which reveals the



median readability estimates for each level of each test, indicates that for the most part each test level's median readability estimate is at the approximate difficulty level for the intended test audience. However, the range of readability estimates, also provided in Table 3, for each test level discloses a wide disparity in terms of the difficulty of the passages within a given test level. Specifically, the middle levels of the five tests show the widest range of readability estimates, varying from a three grade level range to a twelve grade level range. Refer to Table 3 for a complete summary of the median readability estimates and range of readability estimates for each level of each test.

With regard to passage length, sentence length, and item density, selections vary considerably in length, and selections within a test are not arranged from shortest to longest. Some of the tests have much longer selections than some other tests at comparable difficulty levels. Also, the number of selections at a given level vary considerably among the five tests. Item density results also show wide differences among the tests. Table 4 summarizes the findings concerning passage length, sentence length, and item density.

In order to make inter-test comparisons easier for the reader, a comparison of each area investigated was made at the fourth and eighth grades. The results of this comparison are provided in Tables 5, 6, 7, and 8.

### Implications

A number of implications may be drawn from the findings of this study. Among those that can be drawn are:

1. Users of standardized, norm-referenced tests should remember that test content varies widely from level to level and from publisher to publisher. Therefore, results on any two given levels of the same test or on two different tests should not be expected to be the same for a student.
2. Almost all levels of the tests contain a higher percentage of inference items than literal. These tests are of limited use in assessing literal and evaluative comprehension.
3. Standardized, norm-referenced tests assess comprehension around brief selections and ask too many questions so that some must be about trivia. The tasks in comprehending important ideas in longer passages (as in short stories or in chapters in textbooks) may be quite different. Performance on one may not be similar to that on another.
4. The lack of a substantial number of evaluative items in these tests leads one to the conclusion that the tests tell little about a student's ability to read critically. In addition, some of the tests give limited attention to assessing literal comprehension. Therefore, some of the tests tell very little about how well students can comprehend literally.
5. Many comprehension skills are not assessed in these tests. Therefore, their usefulness in pinpointing strengths and weaknesses in skill areas is very limited. For instance, the *Metropolitan Achievement Test* is limited as a "criterion-referenced" test.
6. Most of the tests show "ragged profiles" in terms of sequential "buildup" in passage difficulty. Publishers may need to give closer attention to this aspect of test development.
7. Instructional decision-making and program evaluation should include other sources of information besides standardized, norm-referenced tests for the sake of accuracy.

The results of this study point out the need for teachers, evaluators, researchers, and administrators to study closely the make up of standardized, norm-referenced tests as well as how they measure what they claim to measure. In the past there have been mismatches between instructional goals and outcomes and the instruments used to evaluate those goals and outcomes. Selecting the correct instrument for program evaluation will provide results which will be more relative to what has been taught.

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Table 1

**ANALYSIS OF DISCOURSE FORM AND COMPREHENSION LEVEL ON FIVE WIDELY-USED  
STANDARDIZED, NORM-REFERENCED TESTS, PRESENTED IN PERCENTAGES**

Test	Level	No. Items	Discourse Form					Comp. Level		
			Narr.	Expo.	Desc.	Arg.	Poet	Lit	Inf.	Eval.
CAT	12	20	67	33	0	0	0	40	60	0
	13	27	67	0	33	0	0	22	78	0
	14	38	20	40	20	20	20	30	65	5
	15	40	17	33	33	17	40	25	68	7
	16	30	13	25	25	37	13	20	70	10
	17	40	13	25	25	37	13	20	68	12
	18	40	0	29	29	42	14	17	68	15
	19	40	0	29	29	42	14	7	78	15
G-M	C	44	55	45	0	0	0	32	68	0
	D	43	31	69	0	0	0	19	81	0
	E	43	29	64	0	7	0	14	84	2
	F	43	14	72	14	0	0	33	67	0
ITBS	7	23	100	0	0	0	0	43	57	0
	8	37	25	75	0	0	0	37	59	4
	9	44	38	62	0	0	0	23	77	0
	10	49	38	50	12	0	0	14	86	0
	11	54	50	38	12	0	0	2	98	0
	12	56	38	38	24	0	12	4	96	0
	13	57	33	50	17	0	17	5	93	2
	14	58	0	71	29	0	29	5	91	4
MAT	Pr. 2	55	64	27	9	0	0	60	40	0
	Ele.	60	64	36	0	0	0	43	57	0
	Int.	60	27	37	27	9	0	40	58	2
	Adv. 1	55	0	75	25	0	0	36	62	2
	Adv. 2	50	0	75	25	0	0	26	70	4
Stan	Pr. 2	48	—	—	0	0	0	0	100	0
	Pr. 3	70	36	55	9	0	9	29	71	0
	Int. 1	72	36	55	9	0	9	29	71	0
	Int 2	71	8	75	17	0	8	37	63	0
	Adv.	74	8	84	8	0	8	35	65	0

Table 2

**SKILLS SAMPLED BY ITEMS ON FIVE WIDELY-USED STANDARDIZED, NORM-REFERENCED TESTS, PRESENTED IN PERCENTAGES**

Test	Level	Grade Level	MI	D	V	C-E	Skills DC	Ch	Seq	FL	Other*
California	12	1.6- 2.9	15	35	0	30	0	15	5	0	0
	13	2.6- 3.9	7	15	26	22	7	7	4	11	0
	14	3.6- 4.9	8	23	0	23	12	12	0	17	5
	15	4.6- 5.9	10	20	0	18	7	15	3	20	7
	16	5.6- 6.9	5	12	0	20	22	10	3	15	13
	17	6.6- 7.9	5	22	0	13	15	13	5	13	14
	18	7.6- 9.9	5	12	2	23	15	8	2	18	15
	19	9.6-12.9	10	5	2	18	18	8	2	22	15
Gates-MacGinitie	C	3	7	55	9	9	11	5	2	2	0
	D	4- 6	16	63	0	7	12	0	2	0	0
	E	7- 9	12	47	12	9	9	7	0	2	2
	F	10-12	16	39	5	5	25	5	0	5	0
ITBS	7	1.7- 2.6	0	57	0	22	8	13	0	0	0
	8	2.7- 3.5	0	52	0	26	7	15	0	0	0
	9	3	9	23	7	36	21	2	2	0	0
	10	4	8	21	4	35	22	6	2	2	0
	11	5	13	17	2	26	31	7	2	2	0
	12	6	14	20	5	16	32	5	2	2	4
	13	7	17	21	7	11	33	2	0	4	5
	14	8	17	21	5	12	29	0	0	9	7
Metropolitan	Prim. 2	2.5- 3.4	7	55	7	15	9	5	2	0	0
	Elem.	3.5- 4.9	5	47	8	22	2	3	12	2	0
	Int.	5.0- 6.9	8	32	17	18	10	3	3	5	4
	Adv. 1	7.0- 9.9	9	36	15	20	11	5	0	4	0
	Adv. 2	10.0+	8	28	12	12	20	4	0	10	6
Stanford	Prim. II	2.5- 3.4	0	0	88	0	12	0	0	0	0
	Prim. III	3.5- 4.4	6	33	50	4	6	1	0	0	0
	Int. I	4.5- 5.4	7	33	17	10	31	0	1	1	0
	Int. II	5.5- 6.9	14	39	6	12	20	3	0	6	0
	Adv.	7.0- 9.5	8	35	11	18	22	0	1	4	1

MI — Main Idea

D — Detail

V — Vocabulary

C-E — Cause-effect Relationship

DC — Drawing Conclusions

Ch — Character Trait/Action/Feeling

Seq — Sequence Relationship

FL — Figurative Language

\*Other Includes: Literary Type  
 Writer's Purpose  
 Recognition Fact/Opinion  
 Propaganda Technique

Table 3

**MEDIAN READABILITY LEVEL AND RANGE OF  
READABILITY OF FIVE WIDELY USED STANDARDIZED,  
NORM-REFERENCED TESTS**

Test	Grade Level	Mdn.	Range
CAT	1.6- 2.9	1	P-2/1
	2.6- 3.9	2/1	1-3/1
	3.6- 4.9	3/1	2/2-3/1
	4.6- 5.9	5	3- 8
	5.6- 6.9	6	5-10
	6.6- 7.9	7	6- 8
	7.6- 9.9	9	7-13
	9.6-12.9	10	6-13
G-M	3	4	2/1-7
	4- 6	6	3-10
	7- 9	8	3-14
	10-12	10	6-13
ITBS	1.7- 2.6	1	1-2/2
	2.7- 3.5	3/1	2/2-3/2
	3	3/1	2/2-4
	4	4	3/1- 6
	5	4	3/2- 6
	6	5	3/2- 7
	7	7	5-11
	8	7	4-11
Test	Grade Level	Mdn.	Range
MAT	2.5- 3.4	2/2	PP-8
	3.5- 4.9	7	3-11
	5.0- 6.9	7	5-10
	7.0- 9.9	9	5-12
	10.0+	10	9-14
Stan	2.5- 3.4	5	
	3.5- 4.4	3/2	3/1- 5
	4.5- 5.4	8	7-11
	5.5- 6.9	9	6-12
	7.0- 9.5	10	7-12

\*PP = preprimer

P = primer

Table 4

**ANALYSIS OF PASSAGE LENGTH, SENTENCE LENGTH, AND ITEM DENSITY ON FIVE WIDELY-USED  
STANDARDIZED, NORM REFERENCED TESTS**

CAT	Psg.	Words	Total Number of		Avg. Sent. Length	Avg. per Psg.		Avg. per Item		Range Items Per Psg.
			Sent.	Items		Words	Items	Words	Sent.	
12	3	300	33	20	9.09	100	6.67	15	1.65	5- 7
13	3	425	44	17*	9.66	142	5.67	25	2.59	5- 7
14	5	899	87	35*	10.33	180	7.00	26	2.49	3-10
15	6	993	91	40	10.91	166	6.67	25	2.28	4- 9
16	8	1459	123	40	11.86	182	5.00	37	3.08	3- 7
17	8	1546	132	40	12.98	214	5.00	39	2.90	3- 7
18	7	1700	113	40	15.04	243	5.71	43	2.83	3- 7
19	7	1815	117	40	15.51	259	5.71	45	2.93	3- 7
<b>G-M</b>										
C	22	1052	85	44	12.38	48	2.00	24	1.93	2
D	16	1342	91	43	14.75	84	2.69	31	2.12	2- 4
E	14	1348	74	43	18.22	96	3.07	31	1.72	2- 5
F	14	1262	57	43	22.14	90	3.07	29	1.33	2- 5
<b>ITBS</b>										
7	5	257	37	23	6.95	51	4.60	11	1.61	4- 7
8	4	380	31	28	12.26	95	7.00	14	1.11	4-10
9	8	1194	110	44	10.85	149	5.50	27	2.50	4- 8
10	8	1596	153	48	10.43	200	6.00	33	3.19	4- 8
11	8	1998	180	53	11.10	250	6.75	38	3.40	4- 8
12	8	2009	178	55	11.29	251	7.00	37	3.24	4- 9
13	6	2074	144	56	14.40	346	9.50	37	2.57	8-15
14	6	1898	123	57	15.43	316	9.67	33	2.16	4-15
<b>MAT</b>										
Pr. 2	10	1007	86	50*	11.71	101	5.00	20	1.72	5
Elem.	11	1256	103	60	12.19	114	5.45	21	1.72	4- 7
Int.	11	1857	120	60	15.48	169	5.45	31	2.00	5- 6
Adv. 1	9	1901	105	55	18.10	211	6.11	35	1.91	6- 7
Adv. 2	5	1564	72	50	21.72	196	6.25	31	1.44	5- 7
<b>Stan</b>										
Pr. II	1	114	6	6*	19.00	114	6.00	19	1.00	6
Pr. III	6	528	36	35	14.67	88	5.83	16	1.06	5- 7
Int. I	11	1476	65	66	22.71	134	6.00	22	0.98	6- 7
Int. II	12	1849	92	71	20.15	154	5.92	26	1.30	5- 7
Adv.	13	2136	103	74	20.74	164	5.69	29	1.39	4- 7

\*Additional items based on sentences rather than passages

Table 5

**ANALYSIS OF DISCOURSE FORM AND COMPREHENSION LEVEL AT  
THE FOURTH AND EIGHTH GRADE, GIVEN IN PERCENTAGES**

	Narr.	Discourse Form				Comp. Level		
		Expo.	Desc.	Arg.		Lit.	Inf.	Eval.
<b>Fourth</b>								
CAT	29	48	9	14	9	30	65	5
G-M	37	63	0	0	0	19	81	0
ITBS	39	45	16	0	0	14	86	0
MAT	63	37	0	0	0	43	57	0
Stan.	37	55	8	0	8	29	71	0
<b>Eighth</b>								
CAT	0	35	35	30	18	18	67	15
G-M	33	58	0	9	0	14	84	2
ITBS	0	78	22	0	22	5	91	4
MAT	0	76	24	0	0	36	62	2
Stan.	8	86	6	0	6	35	65	0

Table 6

**COMPREHENSION SKILLS SAMPLED BY TEST ITEMS AT THE  
FOURTH AND EIGHTH GRADE, GIVEN IN PERCENTAGES**

	MI	D	V	CE	DC	Ch	Sq	FL	Other*
<b>Fourth</b>									
CAT	10	20	0	18	7	15	3	30	7
G-M	16	63	0	7	12	0	2	0	0
ITBS	8	21	4	35	22	6	2	2	0
MAT	5	47	8	22	2	3	12	2	0
Stan.	7	33	17	10	31	0	1	1	0
<b>Eighth</b>									
CAT	5	12	2	23	15	8	2	18	15
G-M	12	47	12	9	9	7	0	2	2
ITBS	17	21	5	12	29	0	0	9	7
MAT	9	36	15	20	11	5	0	4	0
Stan.	8	35	11	18	22	0	1	4	1

\*Literary type, writer's purpose, fact/opinion, propaganda



Table 7

## READABILITY ESTIMATES OF PASSAGES FOR FOURTH AND EIGHTH GRADES

Passage Number	Fourth Grade					Eighth Grade				
	CAT (15)	G-M (D)	ITBS (10)	MAT (Ele)	Stan. (P.3)	CAT (18)	G-M (E)	ITBS (14)	MAT (A1)	Stan. (Adv.)
1	5	7	4	3	3/1	6	3	7	5	10
2	*	3	3/1	4	3/2	11	10	*	10	9
3	3	5	3/2	7	5	9	8	11	10	7
4	8	5	4	4	5	13	9	7	7	9
5	7	6	3/2	6	3/2	*	6	9	12	12
6	*	6	3/2	7		13	6	4	7	12
7		7	4	9		7	**	*	9	11
8		7	6	11			14		9	9
9		5		8			8		15	9
10		7		7			8			*
11		6		9			8			12
12		6					9			10
13		4					7			11
14		10								
15		5								
16		7								

\* — Poetry

\*\* — Invalid score

Table 8

## ANALYSIS OF PASSAGE LENGTH, SENTENCE LENGTH, AND ITEM DENSITY AT THE FOURTH AND EIGHTH GRADE

	Psg.	Words	Total Number of		Avg. Sent. Length	Avg. per Psg.		Avg. per Item		Range Items Per Psg.
			Sent.	Items		Words	Items	Words	Sent.	
Fourth										
CAT	6	933	91	40	10.91	166	6.67	25	2.28	4- 9
G-M	16	1342	91	43	14.75	84	2.69	31	2.12	2- 4
ITBS	8	1596	153	48	10.43	200	6.00	33	3.19	4- 8
MAT	11	1256	103	60	12.19	114	5.45	21	1.72	4- 7
Stan.	6	528	36	35	14.67	88	5.83	16	1.06	5- 7
Eighth										
CAT	7	1815	117	40	15.51	259	5.71	45	2.93	3- 7
G-M	14	1348	74	43	18.22	96	3.07	31	1.72	2- 5
ITBS	6	1898	123	57	15.43	316	9.67	33	2.16	4-15
MAT	9	1901	105	55	18.10	211	6.11	35	1.91	6- 7
Stan.	13	2136	103	74	20.74	164	5.69	29	1.39	4- 7

**REACTION: ASSESSMENT OF COMPREHENSION BY  
NORM-REFERENCED TESTS****ALTA PALMER****Louisiana State Department of Education**

The research report presented by Dr. Ira Aaron and Mr. E. Sutton Flynt, "Comprehension Level Categories of Five Standardized Comprehension Tests," pointed to some interesting information which should have immediate effect upon test selection for use in educational settings. Since the use of test scores may be for prediction of student success in various reading programs, the diagnosis of difficulties in reading, program evaluation, assessment of student achievement, and research, it is well that educators realize the characteristics of some of the most widely used standardized tests. The limitations of standardized tests for each of these purposes have been discussed to a great extent in the past. However, this research report clearly revealed even more basic limitations to varying degrees among the five tests included in the study.

The fact that there needs to be some refinement of the testing effort was implied through this study in that there was little consistency between concepts being taught and concepts being tested. Much time spent teaching isolated comprehension skills was not rewarded by increased student scores because the specific skills were not included in many cases on the major standardized tests. Very few items measuring literal meanings or items giving the test-taker an opportunity to evaluate information were included. The readability of some of the tests was not appropriate to the students for whom the test was designed.

The implications of this research were indeed pertinent to current practices in school systems throughout the country. Test selection and use must be seen with a greater degree of scrutiny, lest untold thousands of dollars continue to be spent in purchasing instruments which are not providing useable information. This scrutiny must be most diligent on behalf of the students whose very lives are affected by one performance on one test at one given time. Teacher opinion and expectation, parental concern, and student self-concept are hanging in the balance of test data reported via a computer stick-on tab and placed on the student's permanent record.

On the opposite side of the testing coin, it would be interesting to find out to what extent the standardized test scores are actually used for adjusting the educational program of the student. Other than grouping for instruction, is there instructional adjustment based on the needs of students as shown by standardized test results?

Dr. Aaron and Dr. Flynt have backed with research some basic feelings educators have had concerning standardized tests, but were reluctant to state. Hopefully, with this evidence, something will be done to strengthen the testing programs as a basis for positively aiding students. Rather than openly endorsing any of the five tests, the researchers urged educators to look closely at the total test make-up, item analysis, and readability of the tests. A comparison of materials being taught and materials being tested was also called for.

**VARIETIES OF COMPREHENSION MEASURES:  
A COMPARISON OF INTERCORRELATIONS AMONG  
SEVERAL READING TESTS**

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The purpose of this paper is twofold: First, to discuss some measurement problems in reading comprehension, and second, to report some research results on a new reading test.

Of all the terms used, and variables presumably measured in the testing of reading performance, none is more difficult to define or specify than the construct, *reading comprehension*. A quick consideration of the other two most frequently measured variables, rate and vocabulary, shows real differences in the clarity of what we are measuring.

In the case of reading *rate*, we have a nice, neat, numerical concept to lean on. It is the number of words read per minute. That sounds very simple and straightforward, and if we ignore the problems of reliability and validity, it is. At least we know what is being measured, even if some of us are not convinced that it is the most important thing to measure.

When we talk about measuring *vocabulary*, we can say some very general, widely accepted things about it. Vocabulary tests are usually thought of as reasonably reliable, and probably valid if they have face validity or content validity for the particular student and curriculum. There are problems when we try to specify exactly what we mean by "knowing a word," but most of us do not reject the test because of these difficulties.

Comprehension, on the other hand, is a much fuzzier notion, and efforts to define it or explain it are less likely to be satisfactory. Efforts to demonstrate types of comprehension, for example, have produced sub-measures that typically do not hold up well in empirical studies. The scores on comprehension sub-scales typically intercorrelate at about the level of their reliability, leading us to question whether they are all really measuring the same thing.

Recent efforts to understand comprehension by means of an analysis of the syntax show promise in understanding the nature of language, and perhaps will lead to better understanding of the comprehension process, but do not solve our measurement problems yet.

In a sense, we are measuring comprehension in all parts of all reading tests, if we consider the underlying process and use the word comprehension in its general meaning to understand. Presumably, the rate measure gives us some notion of the speed with which the reader understands the material. Retention measures also presume that the reader has understood the material and has retained some facts. Few will disagree that vocabulary knowledge is necessary for the comprehension of reading material.

What, then, are we measuring when we present the student with the usual comprehension test consisting of a set of short passages followed by questions? And how does the result of such a performance relate to the other aspects of the reading process? We are not prepared to give a definitive answer to the first question concerning what we are really measuring. However, it seems clear that in some sense reading comprehension occurs at several levels, and we believe that the typical reading comprehension test gets at a higher-order set of behaviors than simple literal understanding and retention of detail.

The student is asked questions concerning main ideas, relationships among ideas, conclusions that can be drawn from the passages, and in some cases is asked to deal with the author's purpose and general approach.

As the questions require more and more manipulation and interpretation of the information given, they seem to become more involved with a reasoning process in addition to the passive reception of the author's message. At some point it is difficult to say whether we are measuring reading ability or general verbal reasoning ability.

As we turn to the other question concerning relationships among various reading test measures, we are fortunately able to examine some empirical data. The data to be presented are the result of several concurrent validity studies done in connection with the standardization of a new reading test, the *Minnesota Reading Assessment* (MRA).

The MRA is designed for administration to students in community colleges, business schools, technical schools, and other secondary and post-secondary training institutions. It is intended to measure the students' competence in those reading skills which are most relevant to school success. The test, available in two forms, A and B, measures *Reading Rate and Retention*, *Vocabulary*, and *Paragraph Comprehension*. Working time is 40 minutes.

The MRA was developed to provide information that would identify students who are in need of remedial assistance. The stimulus materials in the test are especially selected so as to be real-world oriented, vocationally relevant content. The difficulty level is such that the test will discriminate best on the students in the lower portions of the distribution, where judgments about remediation are usually made.

Normative information is provided on (1) students in vocationally oriented programs, (2) students in community colleges, (3) students in four-year colleges, and (4) hearing impaired students.

### Reliability Studies

In a study of the internal characteristics of the instrument at the University of South Carolina's College of General Studies, Columbia, 95 students were studied. Fifty-one took Form A and 44 took Form B. Reliability estimates resulting from that study are: Cronbach's Alpha (.917, .934); Horst (.924, .941); Kuder-Richardson 20 (.917, .934); and Kuder-Richardson 21 (.900, .920) for Forms A and B, respectively.

In another study, interform reliability was studied using data from a sample of 24 students at the University of Wisconsin-Stout, in Menomonie, Wisconsin. The resulting correlations relating form A to form B are as follows: rate, .76; retention, .53; vocabulary, .83; paragraph comprehension, .57; and total score, .82.

### Intercorrelation of Part Scores

In a study of 101 freshmen students attending the University of South Carolina's College of General Studies in 1980, 53 students took Form A and 48 students took Form B of the MRA. The part-score intercorrelations are shown in Table 1.

During the process of standardizing the test, it was possible to assemble data regarding performance on other reading tests on the part of the students in the standardization sample. Such concurrent validity data form the substance of this report.

Studies were done at the University of South Carolina's College of General Studies' Developmental Center in Spring 1980 to determine the relationships between scores on the

*Minnesota Reading Assessment* and two other standardized tests, the *Nelson-Denny Reading Test*, Form C and Form D, and the *Stanford Diagnostic Reading Test*, *Blue Level*. We were interested in seeing the correlations between these instruments and the MRA, and were also interested in the relative difficulty of the tests. The population for these studies consisted of freshmen students mandatorily enrolled in effective reading classes due to SAT verbal scores below 390 and freshmen students referred to the Center for reading or study skills assistance because they were observed by faculty to be having academic problems.

The Nelson-Denny was selected as one of the comparison tests because surveys in community college reading and reviews of the literature have indicated that the Nelson-Denny is the most widely used reading test for that population (Goodwin, 1971; Sweiger, 1972; Landsman and Cranney, 1978; Flipppo, 1980a).

The Stanford Diagnostic, Blue Level, was selected because it was developed to meet the reading assessment needs of grade 9 through junior/community college students, particularly of low-achieving students, and has norms for the junior/community college group. Van Roekel (1978) in *The Eighth Mental Measurements Yearbook* stated "The SDRT has few peers among group diagnostic reading tests" (p. 1299).

### Correlations With Other Reading Tests

#### Criterion-Related Validity

In the University of South Carolina study, comparing the MRA with the *Nelson-Denny Reading Test* to determine the relationships between scores, 53 students took Form A of the MRA, and 48 students took Form B. All students had previously taken the *Nelson-Denny Reading Test*. Table 2 shows the Pearson Product-Moment Correlations between the MRA and the NDRT.

In the related study at the University of South Carolina, 89 students took both the MRA and the *Stanford Diagnostic Reading Test*, *Blue Level*. Forty-four students took Form A and 45 students took Form B of the MRA. The correlations between the subtests of the MRA and the SDRT ranged from low correlations to moderate correlations. The magnitude of the correlations were not the same for the forms of the MRA.

In a different study at the University of Minnesota, 122 students took both Form A of the *McGraw-Hill Basic Skills System Reading Test* and the MRA. The Pearson Product-Moment Correlations between the total scores on the two were as follows: Form A ( $r = .72$ ) and Form B ( $r = .82$ ).

In another study at Lakewood Community College, 17 students took Form A of the MRA and Form C of the *Nelson-Denny Reading Test*. The correlation between total scores was .79.

#### Relative Item Success Study

One way of looking at the appropriateness of a reading test for a given population can be students' ability to finish at least half the test correctly. As part of the University of South Carolina's study, we looked at the number of correct on each subtest of the Stanford Diagnostic, Blue Level, the Minnesota, and the Nelson-Denny. Students were grouped as "correctly answering less than half of the test items" (49% correct or less) or "correctly answering half or more than half of the test items" (50% correct or more). Table 3 shows the data gathered from this study of relative item success on the three tests.

## Results

On the subtests of the Stanford Diagnostic, more students were successful at completing half or more than half of the test items on each subtest. However, there were enough that could not answer half of the items correctly, indicating that this test does discriminate well for lower-achieving freshmen students and for those in somewhat higher ability groups in college reading improvement situations.

On the subtests of the Minnesota, most of the student could successfully complete half of the items. (This could lead to the implication that the Minnesota might be considered "easy" for these students.)

On the subtests of the Nelson-Denny, most of the students could not be successful on half of the items, especially on the vocabulary items.

## Implications

The Stanford Diagnostic is a good group diagnostic test and does discriminate well for this population. We are not surprised by its item success distributions, since a good diagnostic test for this population should look like this. We suggest that the Stanford Diagnostic, Blue Level, is one test that could adequately be used to get a more diagnostic picture of each students' reading abilities and inabilities prior to prescription in college reading improvement programs for the less than adequately prepared students. (Also see findings in Flippo, 1980b for more information on SDRT for diagnosis.)

The Minnesota and Nelson-Denny are not as diagnostic as the Stanford. They are survey tests and are designed to give the screener a general estimate of where a student stands. Is he or she in need of help or not in need of help? This should be asked if the student is being tested to see if he or she requires reading skills assistance. Or is he or she an excellent reader or not very excellent reader? This should be asked if the student is being tested to see if he or she should be matriculated into a special course or program where reading excellence can screen one in or out of a program.

From our observations, the MRA has low item difficulty and identifies students having real problems with weak skills. These are students in need of reading remediation in order to have a chance to succeed in a community college program. Tittle and Kay, in a paper presented to the American Educational Research Association in 1971, called for a test that could adequately identify the lower half of the achievement distribution. The MRA can do that.

From our observations the NDRT is much too difficult for this population and is not an appropriate test to identify students who need help with reading skills in a less than adequately prepared group. It undoubtedly causes frustration and loss of esteem to students who are already frustrated by their academic abilities. The NDRT has a very high item difficulty level and is excellent for identifying highly skilled readers.

## Discussion

Some interesting relationships appear. For one thing, in spite of extreme efforts to make Form A and Form B of the MRA as parallel and equivalent as possible, some real differences appeared in comparisons with other tests. Form B is consistently more highly correlated with the Stanford, the McGraw Hill, and the Nelson-Denny.

The vocabulary measures also are interesting. The various scores labeled "vocabulary" correlate with the MRA vocabulary score at moderate levels, ranging from .39 to .74. However, the vocabulary scores on other tests correlate with

the MRA total score at consistently higher levels, ranging from .41 to .80.

Measures labeled "comprehension," on the other hand, correlate with MRA Paragraph Comprehension from .43 to .60 ( $X = .51$ ). They correlate with MRA Total score from .33 to .61 ( $X = .48$ ). This pattern, even though the differences are not great, shows a reversal of the pattern of vocabulary scores.

We do not feel that there are any very surprising results in any of this, except possibly the high correlations between Stanford comprehension and MRA Rate. One purpose of the studies was to examine the concurrent validity of the MRA. We conclude that such validity has been demonstrated at about the level usually shown by studies of nationally standardized tests.

As a result of the relative item success study, we found that the MRA is quite easy for the freshmen population in a reading improvement program at a major state university. (It should be pointed out that the MRA was designed for the technical and community college student population.) However, we feel that "easy" is to be preferred to "difficult" when the screener is interested in testing to see who has real reading skills problems and just how weak those skills may be.

The relative item success study suggests a need for yet another new survey instrument that could adequately measure students in college reading improvement programs reading above the MRA level but below the Nelson-Denny (probably in the 9th to 12th grade range). A test like that would show distributions similar to those shown by the SDRT with the same population.

Finally, before one decides between the NDRT or MRA or any other reading test, one must know why it is being given and to what population. One should also consult a reliable source, such as a current Burows to see what reviewers say about the difficulty of test items on all instruments being considered. With that information in mind, we think that a good selection of tests can be made. If you want to see who has weak skills, use something that discriminates among low ability students. If you want to see who your very good readers are, use something that discriminates among higher ability students.

We do not think our studies have shed much light on the nature of "comprehension," but we do feel that we have supported the need for appropriate tests to measure reading comprehension for different ability groups.

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Table 1  
MRA Scale Intercorrelations

	Rate	Retention	Vocab.	Para. Comp.	Total	Rate	Retention	Vocab.	Para. Comp.	Total
Rate	1.00	.09	.37	.20	.34	1.00	.32	.41	.35	.46
Ret.		1.00	.20	.40	.54		1.00	.41	.52	.67
Voc.			1.00	.52	.91			1.00	.41	.92
P.C.				1.00	.75				1.00	.67
Total					1.00					1.00



Table 2

**Correlations Between the Minnesota Reading Assessment  
and the Nelson-Denny Reading Test**

NDRT	MRA — FORM A					MRA — FORM B				
	Rate	Retention	Vocab.	Para. Comp.	Total	Rate	Retention	Vocab.	Para. Comp.	Total
Rate	.42	-.11	-.07	.01	-.08	.39	-.17	.10	-.01	.03
Voc.	.34	.11	.39	.37	.41	.47	.18	.54	.15	.48
Comp.	.21	.24	.21	.43	.33	.42	.45	.51	.50	.61
Total Score	.31	.21	.34	.47	.42	.52	.36	.61	.37	.62

Table 3

**Relative Item Success on the Stanford Diagnostic Reading Test — Blue Level, Minnesota  
Reading Assessment, and the Nelson-Denny Reading Test — Forms C and D**

	Literal Comprehension (SDRT)	Inferential Comprehension (SDRT)	Word Meaning (SDRT)	Word Parts (SDRT)	Phonetic Analysis (SDRT)
Total Number of Students	127	127	127	127	127
Correctly Answered less than half of the test items	47	26	21	20	38
Correctly Answered half of the test items or more	80	101	106	107	89

Table 3 (continued)

	Structural Analysis	Scanning & Skimming	Fast Reading	Retention Vocabulary (MRA)	Vocabulary (MRA)
Total Number of Students	127	127	127	114	114
Correctly Answered less than half of the test items	21	40	64	16	16
Correctly Answered half of the test items or more	106	87	63	98	98

	Paragraph Comprehension (MRA)	Vocabulary (NDRT)	Comprehension (NDRT)
Total Number of Students	114	127	127
Correctly Answered less than half of the test items	9	114	84
Correctly Answered half of the test items or more	105	13	43

## REACTION: VARIETIES OF COMPREHENSION MEASURES

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### Measurement Problems

The authors present validation results on a new reading test in an effort to alleviate one persistent problem encountered when reading professionals debate the measurement of the reading act. Their insightful discussion of the implications of measuring *reading comprehension* mirror the frustration of researchers who endeavor to assess that for which there is no definition.

How, for instance, can a measure of vocabulary knowledge be removed from any measure of comprehension? Aren't these, in fact, the same constructs? They differ, perhaps, in the number of units involved, but is not *knowing a word* a form of comprehension? The higher correlations between vocabulary subtests and most comprehension subtests in contrast to lower correlations between the varieties of subtests of comprehension tend to underscore the overlap between vocabulary and comprehension.

Why do subtests of Paragraph Comprehension tend to have such depressed correlations? Could various tests be tapping differing content? Varying student performance levels would be expected depending on their differing mastery of background concepts; this would result in lowered correlations. Could syntactical features, as yet fully identified, be left uncontrolled? Presumably various authors' writing styles would reflect varying levels of syntactical difficulty rendering passages differentially difficult and depress correlations.

Another tact might question whether we are measuring comprehension validly with the familiar short paragraph, multiple-level question format used in most standardized tests. Is this reflective of a realistic reading context? Does the abbreviated, tight format and the syntax of the written multiple-choice comprehension (which varies from the syntax of the orally-presented conversational question) validly measure actual reading comprehension? The authors suggest that we may be tapping constrained verbal reasoning, as opposed to actual reading comprehension.

The new reading test, the *Minnesota Reading Assessment (MRA)*, speaks to a final consideration: the intent of current tests of reading. Most current tests endeavor to measure how *well* a student reads. They are measures of achievement related to reading. This presents a problem for the practitioner who deals with low-level classes. The middle school reading professional, for example, cries desperately for off-level norms to evaluate growth by means of standardized tests. When students are given the appropriate test for grade level placement, students fall in the lower quartile in both pre- and posttest measures, showing no growth when tremendous growth might actually be the case. And the standardized tests do not reflect realistic content—in fact, there is an effort to use contexts *unfamiliar* to the student to minimize the interference of background knowledge. These tests, in their academic orientation, are not useful in identifying the functional illiterate—the student who is in functional need for remedial assistance. The authors suggest the *MRA* as an alternative.

### The Minnesota Reading Assessment (MRA)

The *MRA*, then, is intended to be a form of functional literacy test designed to identify, of those students in vocational program, community colleges, and similar

programs which are functionally remedial. That is, which of the poor readers will be in jeopardy as they attempt to interact with reading in a real-world situation?

The process of validation of the *MRA* revealed some interesting contrasts with the more widely used *Nelson-Denny*, *Stanford*, and *McGraw-Hill*. The relatively high correlation of *N-D*, *Stanford*, and *McGraw-Hill* vocabulary measures with *MRA* total test scores underscore previous measurement considerations related to subtest overlap. The higher correlations of vocabulary subtest correlations with comprehension subtests is not found in these validity data, however, further confusing the issue since comprehension subtests on the various instruments have a relatively high ( $X = .51$ ) correlation.

The validation studies comparing *Stanford Diagnostic Reading Test* (SDRT), *Nelson-Denny* (ND), and *Minnesota Reading Assessment* (MRA) test results indicate that a different population of students is tapped. Of those readers assessed as remedial on the SDRT and ND, a much lower percentage would be rated as functionally remedial on the *MRA*, evidence that the *MRA* does, as intended, identify more closely a subgroup of functionally remedial students within the lower quartile of poor readers.

**THE PROCESSES OF READING COMPREHENSION  
IN ELEMENTARY CHILDREN; RESEARCH  
RELATED TO INSTRUCTIONAL STRATEGIES TO  
PROMOTE COMPREHENSION**

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Researching the research on reading comprehension inevitably yields for the researcher two essential yet interrelated concerns. The first pertains to measurement while the second concerns teaching reading comprehension. The measurement issue is paramount because any meaningful measurement must be predicated on definition. Without a mutually accepted definition, the teaching of reading comprehension is subject to myriad subjective interpretations by those professing to teach it.

Current literature provides the searcher with a wide array of viewpoints about the nature of comprehension. The more traditional approaches tend to fragment the process into several components or parts. The specific number of fragments ranges from a few to several many times over (Hunt, 1957; Aaron, Flynt, 1980). More recent treatments tend to view comprehension in more psycholinguistic terms, i.e., the syntax, semantic, rhetoric syndrome (Simons, 1971). The most recent references deal extensively with story comprehension (schematic or story grammar) (McConaughy, 1980).

It is significant to note that for all the miles of print on the topic of comprehension little reference is made to silent reading efficacy and its connection to the construct "reading comprehension" (McConaughy, 1978). Truly you cannot have one without the other. Ironically, the interrelationship of the two has never received just treatment in the literature (Hunt, 1977).

**Research: Measurement of Reading Comprehension**

What does research say about measuring reading comprehension? More specifically, can the several specific factors of reading comprehension, as so frequently described by various authorities, be precisely defined through meaningful measurement? The answers, as revealed in the literature, are

three: YES! NO! and MAYBE!

The YES position is proclaimed by a few researchers (Davis, 1944) but significantly, the relatively few studies claiming to identify several specific discrete factors, do not go uncontested by others. Such critics present evidence that only one or two generalized concepts of comprehension are, in reality, being measured (Thurstone, 1946; Spearitt, 1972-1973). So the NO position is held by most researchers when the measurement of several specific factors has been purported (Hunt, 1957). Thus, the MAYBE position is held by most with the qualification that comprehension beyond the literal level be limited to one or at most two so called higher level thinking elements, i.e., inferential, evaluative, reasoning, etc. Thus, to date, measurements of specific comprehension elements have not been conclusively revealed through research. More recently, some researchers have attempted to differentiate between categorically different groups of readers, i.e., beginning-mature, high-powered—low-powered, etc., rather than trying to delineate specific factors (Golinkoff, 1975-1976).

So after decades of research on reading comprehension the reader of research remains in the privileged position of being able to choose from among several disparate positions and enjoys generous amounts of supporting literature to buttress that position. For many professionals, the construct 'reading comprehension' can be bewildering. One recent review of research states unequivocally that "How readers comprehend written materials is still largely a mystery" (Weaver, Shonkoff, 1978).

#### Research: Teaching Reading Comprehension

Can reading comprehension be taught? If the measurement of reading comprehension remains controversial and unresolved can we teach it? The question is crucial. The response from research review, while more positive, must remain: YES! NO! or It All Depends!

YES, obviously we are teaching literal comprehension and concurrently providing endless exercises and practice drills on the several presumed to be specific skills describing so called higher level comprehension, i.e., inferential, evaluative, etc. NO!, some observers hold that, for the most part, teaching reading comprehension seldom exceeds the literal level (Durkin, 1978-1979). Such authorities have advocated for decades that the 'inquiry process' utilized by teachers ought to transcend the literal level. There is little evidence to date that teachers, in general, escape from the literal level to any considerable degree. This state exists despite endless pleas from professional authorities for teachers to do otherwise (Wolfe, King, Huck, 1968). That teacher inquiry (questioning) ought to address inferential and judgmental as well as literal inquiry has not materialized (Guszak, 1967). Similarly and perhaps more significantly, insufficient attention has been given to imagery. Nor is it likely that conditions will change as long as current educational and classroom environments persist. Thus, the fact remains that the generalized construct "reading comprehension" continues to be ill-defined, imprecisely measured, and questionably taught.

Perhaps a different treatment is in order. Accordingly, the purpose of this paper is to propose a somewhat novel position relative to the problems of definition, measurement and development of "reading comprehension." This perspective is predicated on the interactions between the process of silent reading and the construct "reading comprehension." The initial premise defines the "good reader" in terms of good "silent reading." Good silent reading implies awareness of

and proficiency in two distinct and discernably different forms of silent reading (Hunt, 1974).

#### Two Silent Reading Forms

Silent reading efficiency can be delineated in terms of two substantially different processes. The first, the one more commonly the concern in the professional literature, is characterized as **INTENSIVE**. The second, rarely treated in professional literature, may be labeled **EXTENSIVE**. The first is school-based or textual in orientation; the second is more frequently home-based and personal.

In-school (in-house) and out-of-school (out-house) uses of silent reading are manifestly different and need to be so recognized. This is a reality that most professionals have not yet confronted. Strange (1980) alludes to a duality in terms of a continuing "debate among reading experts about whether the reading process is primarily top-down or bottom-up." He indicates that "these positions are also referred to as concept-driven (top-down) and textual-driven (bottom-up). After laboring mightily with the topless and bottomless (perhaps mooning) theories, he credits both Rystrom (1977) and Rumelhart (1976) with deriving a compromise position which is best termed "interactive." But his major concern remains primarily with school-based silent reading comprehension (bottom-up or intensive) and provides no real breakthrough relative to out-of-school (top-down, non-text) comprehension or extensive reading. Stanovich (1980), following consideration of bottom-up and top-down models, amplifies on the "interactive compensatory model." He does so to such an extent that he becomes hopelessly entangled in detail about word recognition vis-a-vis comprehension only to conclude in general terms that which most professionals have recognized for a long time. Namely, that good readers, as a consequence of "rapid context-free recognition ability" possess more attentional capacity—for integrative comprehension processes." Thus, while vague and indistinct on the matter, his concerns are essentially on reading textual material, i.e., in-school; and he never confronts the issue of out-of-school silent reading.

In all recent research no conscious attention is being directed to the process of silent reading. No definitive distinction has been made between two discreet forms. Such a distinction is needed.

#### Definition of Silent Reading—Look-Think-Intensive

In this instance, the silent reading process is characterized by use of a Look-Think response. For the most part, silent reading is truly silent, although intensive in nature. Thinking meanings in response to words seen, rather than responding by hearing or voicing words separately, occurs at this level. Instantaneous whole word recognition at a very high level is implied.

At the intensive level of silent reading, however, every word is Look-Thought in serial fashion. In doing so, the left to right and line-to-line progression is dutifully adhered to. Conventions underlying school-based silent reading hold that books (any printed selections) are read from front to back, first page to last, first word on the page to the last, until all words have been recognized (presumably correctly) and all information is gathered in and remembered. Tradition has it that print is to be read in this linear sponge-like fashion.

To insure mastery of textual content, teachers have adopted a sort of stop and go approach to processing printed matter by all learners within their charge (Hunt, 1979). Typically, the reader is directed to start reading on command a segment of the text (basal or content) and then, at a designated place, to

stop: Red Light! Following sufficient quizzing, the reader proceeds accordingly until stopped by the next Red Light (more quizzes) then on and on—Green Light! Red Light! until the textual content is completed. Of course, the slower the pace of the reader, the greater the number of stops and starts. Frequently, the result is that more time is spent on testing than on reading.

This stop and go approach governs most, if not all, school-based reading. All words are recognized, all ideas are remembered and recalled. Good reading is characterized as total absorption of the content. One succeeds accordingly by getting all ideas from all words wherein the criterion of correctness is pitched at a very high if not perfect level, i.e., mastery. The expectation is that each reader will sweep up all content in sequential linear progression from start to finish.

Accordingly, the effort to recreate the unfolding pattern of ideas is only partially successful for most readers. A relatively few are highly successful. A great many falter badly. Too much burden is placed on memory. Intensive reading occurs as a natural consequence if and when the purpose for reading is to remember everything and to absorb content totally. What is significant to note is that all ideas are treated as if each is of equal worth to all others. And, of course, all ideas are not equivalent in value for any response other than for a literal recounting of the material. The result is generally slow albeit fairly efficient silent reading in terms of school-based purposes (bottom-up).

The side effects of intensive silent reading can be disastrous in that many readers become compulsive about reading everything. They live under the fear of 'missing something' unless they monitor all the print. For them, reading is more often burdensome rather than pleasurable. Too many find reading too laborious. Many become lost souls in so far as other more personal forms of silent reading are concerned.

#### Definition of Silent Reading—Look-Think-Extensive

In this instance, silent reading is best characterized as an efficient thought gathering process. It is idea-centered rather than word-centered. Extensive reading is based on the premise that all words and all ideas are not of equal worth; that there is a relativity of merit among words or word groupings (concepts) and the ideas conveyed by them. By searching out key words and by attending to those words and word groupings which are power-packed with meaning, the reader reconstructs, orders and reorders important ideas rapidly. Meaning is arranged within a larger framework of relative worth and importance of ideas to the reader (Hunt, 1974).

Experiential reading means searching for meaning that matters; it is a Hunt-For-The-Big-Ideas activity. It is much more than merely accumulating every idea, word-by-word, and line-by-line. Much of the less consequential is forgotten and forgiven. As in panning for gold, much of little worth is glanced at and thrown away. The experienced reader learns to discern rapidly the nuggets of value. The process is holistic in the sense that lesser ideas become satellites to the significant ideas as planets to the sun. Reading comprehension, in the finest definition of the term, becomes a process of making a series of judgments about the worthwhileness of ideas.

Look-Think-Extensive silent reading, to be truly efficient, requires instant sight word recognition to a very high degree. However, even the clumsiest reader in terms of word recognition can attempt this process. By searching out some words that are recognized even the poorest performer can find some ideas of personal significance. All readers should be encouraged to realize how the process of efficient silent reading operates no matter how inefficiently applied. Con-

cerned teachers need to explain the procedure to the low-powered readers no matter how feeble the outcome.

#### Two Forms of Comprehension

Once the premise of two forms of silent reading is accepted, it follows that there are two corresponding forms of reading comprehension. One is more concerned with remembering; the other with understanding. When reduced to simplest terms, one form of comprehension serves someone else's purposes; the other serves one's own purposes. No matter how you slice it the reader is either seeking responses previously predetermined as correct or appropriate by someone else or the reader is not. In the latter instance, the reader is satisfying only the self, and can be content with individual, personal, unique responses.

When the orientation is to comprehend an appropriate response as determined by others, then almost by definition, the reader must adopt the intensive form of silent reading. The extensive or experiential form of silent reading is used by accomplished readers when the purpose is personal. In this latter case, the printed material being read is usually self-selected.

#### Comprehension: Predetermined Responses

In the instance of reading to comprehend responses previously foreordained, the issue of the difference between literal versus inferential comprehension (or other so-named higher level thought processes) is subject to question. The instance of literal responses is relatively straightforward. The reader remembers, recalls, recounts or predicts the response designated as correct or the reader does not. But in the instance of inferential responses (however categorized or designated) it is not so easy to declare unequivocally the nature of the response.

This central issue must be addressed: Is an inferential response of the same qualitative character or caliber when the reader must infer a previously foreclosed response as when the reader infers a response which is solely individual and personal, i.e., when no other reader responds precisely in the same manner?

In school-based reading (whether bottom-up or top-down) the majority of inferential or evaluative responses call for a single (correct) answer which someone outside any particular reader's experience has established as correct or most appropriate. Most judgments about the power of a given reader to make inferences are made on the basis of the reader realizing the identical inference which the outside authority has previously deemed to be correct. Granted that readers or learners who are deft at realizing other persons' inferences are highly successful in terms of in-school reading (whether text-driven or concept-driven); yet such success can only be measured within relatively narrow parameters. How significant is the difference, in a realistic sense, between literal and inferential comprehension when in both instances the correct response has been preordained?

As long as the reader is expected to realize someone else's answers, pleas by professionals for open-ended inquiry by teachers will be largely ignored (Wolf, King, Huck, 1968; Durkin, 1978-1979; Guszak, 1967). As long as priority is placed on remembering, recall, recounting or predicting that which is read, questioning will focus on evoking single correct responses regardless of designation, literal or inferential. This fundamental fact of life is so primarily because single correct responses yield much more readily to measurement and, currently within the educational world, measurement is our master. Mastery approaches demand measurement.

Mastery learning of material selected by someone other than the reader is still mastery learning. Obviously, the intensive form of silent reading accommodates the requirement of mastery learning far better than does the personal, experiential form of silent reading.

### Comprehension: Individual Responses

In extensive or experiential reading (Look-Think-Extensive) wherein the response is uniquely individual, no two readers will necessarily respond in exactly the same way. Granted, highly similar responses usually emerge at the literal level of comprehension but, for inferential or evaluative levels, reactions by various individuals will vary widely to the same printed material. There is no necessarily singular correct inference common to all.

Herein lies the rub. Variability among individuals in terms of inferential responses defies easy measurement. The quality of the response can only be judged. And who is to judge: Researchers? Teachers? Both are increasingly hesitant to do so while under pressure to provide precise measures, i.e., competencies, mastery, grades, etc. Consequently, the practice persists of using school-based criteria (bottom-up, text-driven) to evaluate inferential responses of a personal nature. This is a contradiction of forms which confuses the issues and leaves both teachers and readers in limbo. So has it been in the past and seemingly it will continue to be so in the immediate future.

Until the out-of-school form of comprehension (top-down), becomes recognized and incorporated as a legitimate part of the reading curriculum, little more than lip service will be granted to personal, experiential responses. Inquiry will remain predominantly at the literal level. The great irony is that most professional educators (and that includes teachers) use experiential silent reading out-of-school forms for personal reading yet avoid bringing such forms within the boundaries of the classroom, to say nothing about teaching such forms to incipient readers.

### Remembering versus Understanding

There is a real difference in orientation between Reading-to-Remember as contrasted to Reading-to-Understand. Stated in simplest terms, in-school reading comprehension places a high premium on remembering (recalling, recounting and predicting). Conversely, personal forms of comprehension ought to focus on understanding with the broad latitude of individuality of responses this implies.

Until any reader reframes the implicit question which governs purpose in reading from: DO I REMEMBER? to DO I UNDERSTAND? each will be imprisoned by the restrictions attendant with Reading-to-Remember. Once the question to the self is transformed to DO I UNDERSTAND? then the reader can be freed to engage in extensive experiential forms of comprehension. This latter position has never been fully communicated to emerging readers within the context of "teaching reading comprehension." Many readers leave school totally innocent of this distinction.

All professionals, from the most elevated theorists to the lowest practitioners, are imprisoned within the confines of prevailing conventions. The Reading-to-Remember orientation is so pervasive and powerful that relatively few gain freedom from it at least from school-based instruction. The school-based stranglehold is simply too overwhelming. The horizons of all professionals need broadening to encompass the concept of Reading-to-Understand—as well as Reading-to-Remember. A balanced approach is needed. Those learning to read must be so enlightened.

### The Liberated Readers

Who are the liberated readers? Unfortunately, our most versatile readers, readers accomplished in both silent reading forms, represent roughly the top third of our young reader population. Or our older reader populations for that matter. They have learned experiential forms of comprehension (top-down concept-driven) in other than school environments. Most engage in enormous amounts of personal silent reading; a private form of silent reading practice (Private USSR, Hunt, 1979). They have indulged in some form of "flashlight reading" and by doing so, have transcended the narrower restrictions associated with school-based comprehension. Regardless of confining concepts of comprehension practiced in school-based reading, these emerging readers will break those bonds. Their responses to the endless variety of ideas embedded within printed matter will be endlessly varied and experiential. Their central concern is with understanding not remembering.

The professional tragedy is that most of the other two thirds of our young readers will never know. Most will leave school with little or no awareness that there is 'another way'. Many entertain guilt feelings with regard to other than the school-based form of comprehension. Most will have but the haziest notion that efficient readers have gained command of both forms. It is upon them that future oriented teaching of reading comprehension should center. The true challenge in teaching reading comprehension is to establish environments within school which encourage out-of-school sorts of responses, i.e., Reading-for-Understanding for those who otherwise will be deprived of the opportunity to do so.

### The Teaching of Reading Comprehension

Far too much has already been written in the professional literature about teaching intensive forms of silent reading and school based comprehension. A plethora of advice to teachers exists for *teaching* conventional definitions of reading comprehension. For those professionals concerned with teaching extensive forms of silent reading and conceptual forms of comprehension the following commandments are offered.

1. A daily silent reading practice period (USSR, Hunt, 1967, 74, 77) is mandatory. Self-selection by the reader of printed material is important, but not necessarily required. The orientation to purpose for reading, as guided by the teacher, should be on understanding not on recounting or remembering.

2. Inquiry in this instance implies open-ended discussion which focuses on personal responses to ideas of relative worth and significance to the reader. Such discussion is a vital component of the silent reading practice period. Inquiry and discussions may be conducted within the framework of total group, small group, or individual settings. The principal focus of the inquiry must always pertain to the part or parts which reflect the greatest potency of meaning. There are a variety of ways to put the questions but, however stated, those responding should be forced to choose responses on the basis of relative worth from among sundry ideas or items encountered within the print.

Most readers have been conditioned to respond by recounting material read from beginning to end. Such responses must be prevented, sometimes even forbidden. Inquiry must stress forced choice of ideas or items of information. There should be little room for compromise in this approach. Inquiry of this sort is instrumental in shifting the reader's mental attitude away from merely remembering, recounting and predicting to one of searching and selecting.



For some, albeit gradually, the attitude of reading to understand emerges and becomes internalized within the reading pattern.

3. Imagery, the act of formulating pictures in the mind, is an essential element in reading for meaning (Witte, 1978). The following progression ought to be encouraged. With guidance, the reader should realize that printed words can be transformed into mental pictures, which in turn, can then be returned to verbal statements either oral or written. Efforts should be made to cause the resulting verbal restatements to be produced from the pictures formulated in the mind. Too much of our current effort remains at the verbal level, i.e., using words to recount words.

There is a wide range of facility among readers with respect to creating pictures within the mind's eye. Some are able to produce mental images of great clarity, something akin to creating within the mind's eye a continuous running movie picture in living color a la TV. At the other end of the continuum there are those whose minds remain blank in so far as pictorial imagery is concerned.

Such wide differences must be accepted and accommodated. Yet all readers need to be encouraged to transform the verbal to the pictorial to the extent possible and regardless of the degree of success. The attempt heightens the process of sorting out and judging ideas according to their relative worth.

4. The term "High Potency," (Thorndike, 1919; McConaughy, 1978) indicates the fact of relativity of meaning among the word elements comprising any given passage. In any communicative discourse (oral or written) certain particular words (or word groupings) contribute substantially more to the composite or total meaning than do others. In any given language segment, whether it be words, phrases, sentences, paragraphs, sections, chapters, etc., a relativity or hierarchy of worth exists. Responding to "high potency" elements enables the reader to sense these larger frames of reference. Through proper weighting, the inherent hierarchy of meaning embedded within the total passage is truly mirrored. Major ideas rise to the surface; minor details are subdued. Searching out the "big ideas" becomes the name of the reading game. Conceptual forms of silent reading comprehension become feasible.

5. Concept Development is basic to an experiential conceptual form of silent reading. For the young learner, meanings of words (singular or collectively), which in turn represent conceptualization of ideas, evolve over time and are gradually refined as part of the developmental growth process within the cognitive/language area (Pearson, 1978; Russell, 1961). Concept development, which is basic to meaning, is a dynamic, expanding, and evolving process and should not be thought of as a static, fixed, or finite entity at any point in time (Hunt, 1978).

Childhood concepts cannot be adult concepts. This fact must not be overlooked nor forgotten. Paying more attention to concept development from start to finish is imperative if greater overall growth in reading comprehension is to be realized. Concept development, more than any other factor, provides the broad, sweeping avenue to meaningful reading in terms of the "High Potency" construct.

Building concepts, simply put, is a process of sifting and sorting through a vast array of bits and pieces of information received from the never-ending source of daily experiences. Eventually and ultimately, many particular bits of experience are checked out and found to be of little consequence. Such irrelevancies are discarded or downplayed and the emerging essential elements are weighted and organized. Given time, the significant essentials, properly selected and arranged,

form a general principle. Subsequently, this principle is tested, retested, and refined until the generalized statement is realized in its most effective and operational form. Obviously, for many learners, final realization of the ultimate precept is never fully achieved. But, for a great majority of concepts, as well as for a great majority of learners, the ideation of many particulars into a workable whole, emerges. However incomplete and partial in terms of final formation concepts may be, they provide the building blocks whereby meaning in reading is realized.

6. Multiple Meanings of words play a significant role in conceptual reading (Hunt, 1978; Pearson, 1978). Many if not most high potency words have multiple meanings influenced by the different contextual settings within which they reside. Sensitivity to this basic fact is essential for concept development. Young learners need time to develop such sensitivity. The punster is the obvious example of one who has fun with "multiple meanings." It may sound punny to say so, but that form is the crudest employer of double meaning. Riddles and jokes follow closely in that they, too, frequently employ secondary or double meanings. It follows that employing these forms with young readers ought to be taken seriously and significantly rather than lightly and frivolously (in an instructional sense); this fun and funny playing with language, however crude, provides a basis upon which more subtle connections may be better understood at a later time by the emerging learner.

7. Metaphor and Symbolism represent the most difficult, complex, and sophisticated conveyances of meaning. In the least complex sense, the reader must handle double meanings, the double entendre. In the most complicated sense, the reader must handle several layers of meaning often with remote and subtle connections. Frequently, it is a case of symbols representing symbols which, in turn, are representing symbols. Reality may lie somewhere within this hierarchy of symbolic representation. It may not. Characteristically, imaginative and fanciful thoughts are usually portrayed through metaphor and symbolism with little or no reality for an anchor.

It follows that the young learner needs extensive exposure to myth, fantasy, and imaginative literary forms. This is needed so that a background for interpreting metaphor and symbolism will be woven and embedded into the fabric of concept development, both conscious and unconscious. It should go without saying that such exposure is best accomplished through reading by adults to young learners. Of course, both didacticism and pendency should be avoided at all cost while doing so. Simply explaining the symbolic connections is sufficient.

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## **REACTION: INSTRUCTIONAL STRATEGIES TO PROMOTE COMPREHENSION**

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Lyman Hunt's distinction between intensive and extensive, silent reading seems to be a valid one, often overlooked by researchers, teacher-educators, and teachers. Often teachers unwittingly require intensive forms of responses following what ought to be an extensive reading experience by asking a student to recall the plot or to remember details. The teacher who asks the student to read his/her favorite section, or to create an artistic replica of a favorite scene, is more in keeping with the extensive form of silent reading.

Hunt's distinction between spotlight and flashlight reading also seems valid. Perhaps flashlight reading outside school is necessary to develop the experience and habit of extensive reading. One wonders whether sustained silent reading alone (in-school) is sufficient to develop experiential forms of comprehension. The role that parents play in reading to their preschool and school-age children ought to be emphasized as an important means for developing the extensive form of reading.

The problem, however, is this: How can teachers and parents who have not experienced extensive reading convey this concept to children? Parents who do not habitually read (i.e., are not extensive readers) probably do not read much to their children. But what about teachers? Should teachers be screened from the teaching profession if they have not experienced extensive reading; or should an attempt be made to promote extensive reading in preservice teachers?

While most preservice teachers probably have experienced flashlight reading, an informal query of students that I have made every term for the past several years has revealed, in almost every class, at least one person who confesses to dislike reading and several who do not read voluntarily. In fact, a written survey (Trueblood and Askov, in preparation) of 107 preservice teachers' (elementary and special education) attitudes toward reading, given before their reading methods course at Pennsylvania State, has revealed a range in scores

from 27 to 105 (possible Range = 26-150;  $x = 62.6$ ;  $SD = 13.9$ ). At the end of the reading methods course their expressed attitudes toward reading essentially stayed the same, indicating considerable variability in how preservice teachers feel about reading. We cannot assume that teachers feel positive toward reading or have experienced the extensive form of reading.

Can teachers who have not experienced extensive reading themselves promote it in their students? I am afraid the answer may be negative since their own view of reading is limited to the intensive form or bottom-up processing. On the other hand, reading methodology textbooks and instructors could make teachers aware of the distinction between the two forms of silent reading comprehension. With this awareness perhaps teachers could become more sensitive to students' divergent responses to literature whether as part of intensive or extensive reading. Perhaps they can learn to recognize when convergent responses are appropriate and when they are not.

Hunt's proposal to use imagery in concept development is an interesting one, and one that is recently being investigated. As Hunt points out, we all do not possess the same ability to visualize what is described verbally. Can a teacher who does not form mental pictures encourage them in others or understand their role in concept development? Regardless, teacher education courses should encourage this type of experience among students.

The reading program of the State College Area School District, as described in examples provided by Christopher Mare at the conference, does encourage the development of these processes. Reading and social studies are integrated into units. As students study the westward movement, for example, they are to imagine themselves making that trip. The imagery created helps the students develop the appropriate concepts of pioneer life. Intensive reading is taught through an "instructional book," a given library book selected at an appropriate reading level for each group, as well as through the "morning letter," a daily letter written by the teacher to the students containing important vocabulary and emphasizing the word recognition skills being studied in context. Extensive forms of reading are encouraged in daily sustained silent reading, usually with books fitting into the unit theme. As part of the process of sharing their books, students often create artistic projects, such as dioramas and murals, or act out characters or scenes from a book. Evaluative strategies are not applied to extensive reading but are reserved for intensive reading.

In conclusion, Hunt's distinction between the two forms of silent reading comprehension seems useful. The difficulty with implementing extensive reading and imagery is that they cannot be taught—they have to be experienced. A teacher who has experienced neither probably cannot appreciate the value for students. Nevertheless, teacher educators have a responsibility for presenting the distinction and offering guidelines for implementation.

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## GLOSSING FOR IMPROVED COMPREHENSION: A NEW LOOK AT AN OLD TECHNIQUE

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In the paper I presented at the first general session of this conference (Otto, 1980), I alluded to an instructional technique that my associates and I are developing in the hope that it will "... help to improve (readers') comprehension—not just what we know about comprehending." Very briefly, the technique involves *glossing* expository text; that is, we are using marginal and other intratext notations—gloss—to direct readers' attention while they read. Neither the idea nor the term is new; both date back at least to medieval times, when theologians used gloss to illuminate biblical texts. What we are attempting to do is to systematize glossing procedures so they can be used with confidence, both formally, in preparing instructional materials, and informally, in face-to-face teaching in the classroom. In the paper I discuss some of the issues we have begun to deal with as we move toward systematic glossing.

Our experiences so far include (a) developing and trying out prototype glossed materials, (b) working with teachers and teachers-in-training to make informal applications of the glossing technique, and (c) examining selected studies that appear to have particular relevance for our continued efforts. We feel we have reason for optimism. Students report informally that gloss does indeed help them tackle the complex task of reading expository text. The teachers we have worked with are not only impressed by the high face validity of the prototype gloss activities, but they are also enthusiastic about using the glossing techniques informally when they teach from content-area texts. And we are satisfied that there is a related literature that offers both general support and specific implications for proceeding with the development of glossing procedures. [See Otto, White & Camperell (1980) for an extended discussion.]

We feel that we are now at a point where we have bases for giving serious consideration to the function of glossing as a technique for helping readers understand expository text and for refining our specifications for developing glossed material. In this paper I discuss, first, an admittedly idealized view of the function of gloss; then I consider the "focus" of gloss, acknowledging the need for a dual focus on both *process* and *content* as well as concern for certain constraints and considerations; and finally I outline some developmental steps for refining the glossing technique.

### Function of Gloss

In my first general session paper (Otto, 1980) I commented on three alternatives reading educators have traditionally used in their attempts to help students comprehend: (a) modify the text; (b) augment the text; and (c) modify the students' reading behavior. I suggested that these alternatives share a common flaw: their focus is too limited. Emphasis is placed on the text, on the teacher (i.e., teacher-directed activities), or on the reader (i.e., reader-imposed behavior or strategies); and important interactions among all three are ignored. Then I suggested that an effective instructional technique ought to give concurrent attention to all three. In other words, the technique would bring together the diverse aspects of a complex teaching-learning process. We believe that, with development and refinement, the glossing technique can serve that integrative function.

Yet a truly effective instructional technique for helping readers deal with expository text must have two characteristics in addition to the integrative function. It must secure and sustain learners' active involvement; and it must provide for the internalization and application of the skills and strategies that are taught. Gloss activities can virtually ensure the former if they (a) acknowledge the learners' prior experience, or lack of it; (b) lay out a useful strategy for pursuing the learners' purpose; and (c) require overt, interactive responses from the learner. Whether gloss can effectively do more than set the stage for the latter remains to be seen. That is, gloss activities can straightforwardly call for the application of skills and strategies, thereby setting the stage for internalization; but ultimately internalization and automatized application with "unglossed" material go beyond the activities we can provide. The best we can do is to work out effective strategies not only for initiating but also for "fading" readers' involvement with the gloss activities. I return to this point in the final section of this paper.

### Focus of Gloss

When we first began to consider the notion of glossing as an instructional technique, we thought of it mainly as a means for, first, developing and, then, encouraging the application of the specific comprehension skills we had identified in our earlier work. Some examples of specific skills we have worked with are (1) determining the central thought of a paragraph or of several paragraphs; (2) using context clues to figure out the meaning of an unfamiliar word; and (3) identifying relationships to make a conclusion. We still believe that glossing offers an effective way to deal with specific skills; but as we have examined related research and interviewed students, we have been convinced that we need to broaden our focus on skills to include the more general strategies that efficient readers use to understand text.

One example of a general strategy is consciously relating new information, as it is read, to one's prior store of knowledge or to information that was acquired from reading the preceding pages. Such a strategy is suggested in a variety of sources, which include the work related to schema theory, work by Smirnov (1973) and by Brown (1977) in the area of cognitive development, Kintsch's (1978) work on developing his model of comprehension, and the line of research related to readers' mathemagenic behaviors. The need for such a strategy is supported by our observation that when students were asked to describe what they do when they read to understand, some of them said that they relate what they read to what they already know or to what they had read previously. Another example of a general strategy is the practice of self-questioning, which is suggested by several investigators who are interested in metacognition. We also found in our interviews with students that some of them use self-questioning as a rehearsal strategy for remembering as well as for assessing and monitoring their own understanding of what they read.

Through gloss activities we hope, first, to help students become aware of the usefulness of these and other strategies and, second, to help them learn how and when to employ these strategies as they read content-area material.

Although we are mainly concerned with the process of reading content-area texts, we recognize that we cannot focus on process without considering content as well. Consequently, in addition to broadening our process focus to include strategies as well as skills, we acknowledge the need for a dual-focus on content and on process. While nobody can

claim to be expert in every content field, one can apply the principles of text analysis to materials that were written by experts. Employing such techniques as mapping, outlining, or the more formal text analysis systems described by Kintsch (1980), Meyer (1975) and others, teachers who are generalists should be able to develop gloss activities that deal with important aspects of content. In other words, properly conceived gloss activities ought to be directed toward enhancing the understanding of specific text content even as they shape the development of "generalizable and internalizable" skills and strategies. The effectiveness of gloss activities that claim a dual focus on content and process, then, must ultimately be demonstrated by a specific (content directed) as well as a more general (process directed) effect: improved understanding of the glossed material and internalized skills and strategies that enhance readers' ability to tackle any reading task.

Up to this point in the discussion I have said that glossing text ought to have an *integrative effect* and that gloss must have *dual foci*, which direct attention to matters that are related to process and to content. If the preceding sentence sets parameters for glossing, then our task is to elaborate, clarify, and refine those parameters to a point where we can outline reliable procedures for preparing effective gloss. We expect to pursue that task. Figure 1, which depicts interrelationships as well as parameters, provides some direction. The explanation and discussion of Figure 1 that follows is an attempt to explicate some of the assumptions and concerns that are embodied in the figure.

### Parameters and Interrelationships

On the perimeter of the figure, the content and process arrows of the dual focus flow toward the finished product: gloss (text augmented by gloss activities). The arrows are arranged and interrupted to indicate that even as the dual foci direct attention to both process and content, attention is also given to (a) the complex and interacting constraints and consideration of the learning environment, and (b) any possible need for "excursions" either to augment information in the text-at-hand or to enhance the learner's skills and strategies. First we offer some comments on the excursions; then we consider the constraints and considerations.

**Excursions.** By "excursions" we mean instruction that is offered in addition to the regular gloss activities provided for a specific text. One example, on the process side of the figure, is the kind of instruction offered to a reading skill-development group, where a given skill or strategy is taught intensively and in relative isolation from application in content-area reading. The point of such instruction is to introduce and to sharpen the learners' awareness of the skill or strategy and to provide opportunities for application. While we should attempt to design gloss activities that make for the acquisition as well as the application of specific skills and strategies, the fact is that certain readers and/or certain texts will require intensive preparation for working with the particular skills and strategies stressed in glossed text. (In fact, we suspect that the introduction and sharpening of most skills and strategies is most appropriately handled in such a manner. Whether this is so remains to be seen. The question of when and how acquisition proceeds to application—insofar as the main thrust of instruction is concerned—is an important one.)

An example of an excursion on the content side of the figure is instruction that is designed to provide basic background information or to elaborate or augment given

information in preparation for reading a given selection of text. Again, the point is that certain readers and/or certain texts will require *additional* information as a precondition to working with glossed text. Of course the question of when an excursion is called for and when an anticipated lack of background information can be handled with gloss is another important one. It seems almost certain that if gloss gets bogged down with too much basic information it will become cumbersome and sluggish, thereby losing both its appeal and its effect.

**Constraints and considerations.** The constraints and considerations identified in Figure 1—Expectations, The Milieu, The Reader, and the Text—are, as we pointed out earlier, aspects of a complex teaching-learning process. It is important that all of these aspects, and the specific factors associated with them, be given consideration in preparing gloss activities. And, if gloss is to have the integrative effect that we are seeking, it is equally important that *concurrent* consideration be given to, at least, the most *potent* factors. Yet the reality is that the universe of factors is virtually limitless, so an important aspect of the task of establishing guidelines for effective glossing is to identify the ones that are likely to have the greatest impact in given situations.

Again, for the moment the aspects of the reading-learning process that are given in Figure 1 acknowledge the fact that factors associated with each of them deserve consideration and impose constraints on the glossing process. The specific factors and particularly the interactions among them, remain to be more fully understood in terms of their impact. Meanwhile, we have tentatively identified what seem to be some of the more important factors associated with the four aspects identified in Figure 1.

The nature of gloss activities must, of course, be shaped by the explicit and implicit *expectations* that can be identified. That is, the effectiveness of gloss will be largely determined by the extent to which it is in line with and contributes to the attainment of expected outcomes. Both the goals of the overall curriculum and the stated and unstated objectives of content-area teachers need to be considered to give the gloss direction and focus. The specific measures to be used in assessing outcomes also merit careful consideration, since we know that different measures may yield different results (e.g., Kendall, Mason & Hunter, 1980).

Consideration of specific factors in *the milieu* makes it possible to deal with the mundane but important matters that often make the difference between failure and success in planning instruction. One obvious factor is the time available; gloss prepared for one hour of available time would undoubtedly be quite different in terms of degree of elaboration and types of responses required of learners from gloss prepared for ninety minutes or two hours of available time. Likewise, gloss prepared for individuals and gloss prepared for groups *might* need to incorporate different directions and different types of activities in order to sustain interest and effective involvement. And of course gloss ought always to be prepared in view of the best technology available: the most appropriate techniques applied in the appropriate manner for a particular individual or group.

Many factors related to the reader could, and should ultimately, be identified and clarified. But most important for our immediate purposes are the reader's prior knowledge of text content (i.e., content knowledge) and the reader's knowledge of and ability to apply specific skills and strategies (i.e., process knowledge). The preparation of gloss—and decisions about when and how to take planned excursions—will be heavily influenced by both of these factors. Together, they, in effect, are the "givens" to which new information

must be related for assimilation, accommodation, and application.

Similarly, the text is a given that can, presumably, be brought into closer juxtaposition with the reader through glossing. In order for gloss to bring the text and reader closer together, important concepts and ideas must be identified through some type of text analysis; likewise the skills and strategies students need to use in order to read a text must also be determined through systematic analysis. The identification of the important concepts and the skills and strategies needed to read and understand these concepts provides a more definitive focus for preparing gloss activities.

### Stages of Gloss

While the immediate focus of gloss is on both content and process, the ultimate goal is to help students not only to acquire but also to internalize and apply the skills and strategies that enable them to be independent readers of the full range of materials they encounter. Norman, Gentner, and Stevens (1977) put it like this: "... if a child knows how to learn, then he can get the knowledge by himself" (p. 194). If gloss is to contribute to that goal of independence, then we need to do more than simply provide gloss that is effective in improving students' comprehension of text. We must also provide for the systematic internalization and fading of the support that is provided through gloss in order to help students to sustain their use of the skills and strategies when they are on their own. On the basis of our experience and observations so far, we envision four distinct levels or "stages" of preparing and interacting with gloss activities: (1) demonstration; (2) development; (3) internalization; and (4) fading. Each stage can be briefly characterized in terms of focus and function as we see them now.

Activities at the *demonstration stage* ought to create awareness of the different features of a text (e.g., things so mundane as chapter heads and subheads, and things so relatively esoteric as different organizational patterns and styles) and of the skills and strategies that can be used to read that particular text with understanding. The main function of the activities at this stage, then, would be to provide immature readers with models that approximate mature readers' perceptions relative to extracting meaning from text. That is, the gloss activities, or models, include reflections, queries and applications that lead students through some of the same thought processes mature readers experience as they read and study expository texts. Demonstration gloss activities describe what is—or ought to be—happening as one reads. Stated bluntly, we would hope that by preparing effective demonstration gloss we could develop students' enthusiasm for working with glossed materials. The goal is to win them over by showing them that it works and is worth the effort.

Just as demonstration gloss activities would provide descriptions of *what* is happening, gloss activities at the *development stage* would provide *explanations* that help students to develop an understanding of *how* to make active use of the skills and strategies they need to read and comprehend the content. As we see it now, gloss at this stage should include clarification of behaviors related to specific skills and strategies, explanation of how to use the skills and strategies, and opportunities to apply the skills and strategies in reading content-area texts.

At the *internalization stage* gloss activities would provide opportunities for students to continue to use the skills and strategies that were introduced and sharpened at the

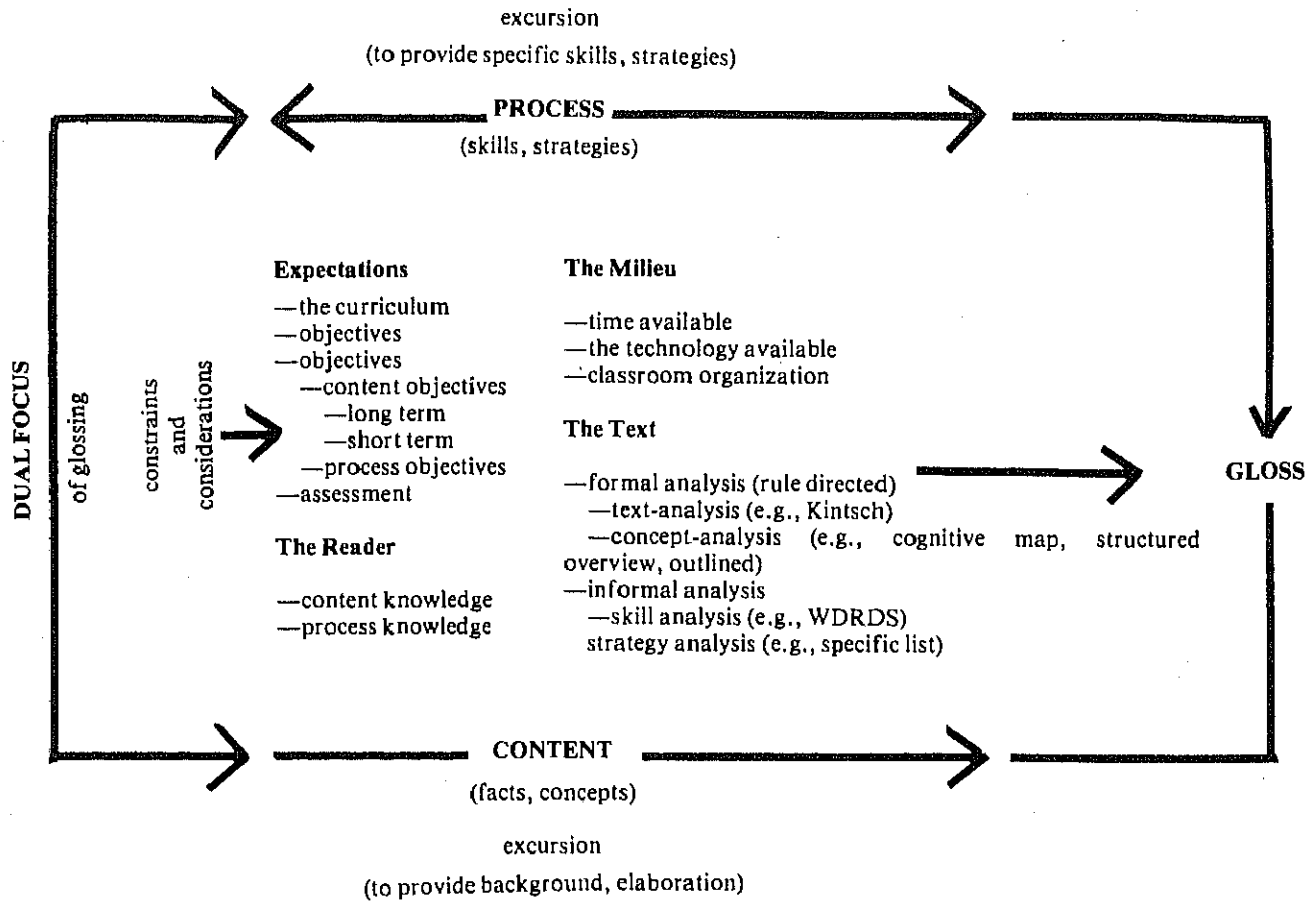
development stage in a wide variety of contexts. At this stage one can envision activities that are designed to help students move closer to independence by helping them move toward a level of metacognition. The activities would go beyond providing opportunities for application and practice; and the focus would be on developing students' awareness of *when* they could apply skills to understanding text and *which* skills and strategies might be more appropriate in different situations.

By the time students reach the final stage, *fading*, they will, presumably, have internalized the skills and strategies (i.e., they will have become aware of skills and strategies and be able to apply them in a variety of contexts). The function of the gloss activities, then, would be simply to remind readers to think about their own efforts to understand what they are reading, to think about the skills and strategies that help them to comprehend given information, and to correct any miscues or misconceptions that may be clouding their understanding. That is, to use a term from the work in artificial intelligence, gloss activities at the fading stage should remind students to "debug" their understanding (i.e., eliminate false perceptions) as they read. Students who reach the fading stage will, essentially, have attained the goal we set: they will not only possess the skills and strategies required to read content-area texts, but they will be aware of their ability to use the skills and strategies and know when and how to apply them.

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# A MULTIVARIATE ANALYSIS OF PRINCIPLE AND TRACE ELEMENTS IN MATURE READING COMPREHENSION

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The study of reading comprehension effectively has been reduced to its most frequent operational definition: some variation on recognition-recall of graded passages. This conventionalized and delimiting construct seems to be understood about as well as it can be from previous studies. The search for trace elements in Conventional Reading Comprehension (CRC) would be unnecessary, for example, because it is a relatively crude construct. Spache and Spache (1975) have pointed out that recent factor analytic studies of reading comprehension, summarized, conclude that it consists of essentially three factors: a *word* factor, representing knowledge of word meanings; a *relationship* factor, reflecting the discernment of variously stated ideas; and a basic *reasoning* factor, referring to the drawing of direct conclusions and inferences.

Mature Reading Comprehension (MRC) is an alternate construct, more inclusive, and logically supportive of the intention of reading and education than is CRC. This study is addressed to the delineation of elements within MRC which are, and are not, synonymous with the conventionalized form of CRC, though undoubtedly are latent within it.

The term *trace elements* is intended metaphorically, here, to suggest the slight, or overlooked, factors and/or key relationships necessary to nourish reading comprehension to mature levels. If such elements could be found in reading comprehension, these would be expected to parallel the role(s) of potassium, zinc, and iron, in providing for continuous growth and fine tuning of brain and muscular functions. The reasoning underlying this possible analog was simple: an identical passage read by persons of seemingly comparable ability causes some to gain informational weight, others to formulate ideas, and still others to be sparked to higher levels of critical and creative thought; therefore, there must be some less than obvious factors operating to cause some persons to metabolize essentially the same information more fully and expansively than others. Thus, we imagined that subfactors, or trace elements, accounting for these puzzling differences were being drawn upon, and that the presence of these would become increasingly evident where fine tuning was required, as in critical-reading-thinking behavior, or mature reading comprehension.

## Goals of the Study

One of the goals of this effort was to make the study of deeper levels of comprehension possible. To do so, comprehension was redefined as mature comprehension, and new relationships were projected which, if realized, would provide a significant level of validation for the new construct, and serve as a point of departure for subsequent inquiry into related questions, such as: are there optimal levels for certain elements, or factors; are there certain elements (or skills) which actually might be counter-effective at higher levels of intensity; are certain skills or elements needed in higher concentration at one stage of development than at

another; and an array of related combinatorial questions, such as, what is the influence on certain skills and elements of environmental, temperamental, and situational factors?

This effort is part of a larger design to delineate better a concept and definition of overall reading maturity. Principally addressed in the larger study, and reflected in the current study, are questions concerning the dynamics of continuous growth in reading, language, and learning, and the questions of whether these can be ferreted out for a given individual so as to be able to state that individual's peculiar mode of growth, as well as whether that individual is growing in a timely way. We refer to this more embracing construct as Progress Toward Reading Maturity (PTRM) to distinguish it from previous and related efforts (Manzo & Casale, 1979).

The test factors employed in the current study of principle and possible trace elements in reading comprehension are the same as those fashioned for the larger study.

## Definitions

Both conceptual and operational definitions of reading comprehension and of mature reading comprehension are provided, followed by a description, in the method section, of the test factors employed, and the data analysis procedures selected.

*Conceptual definition of Conventional Reading Comprehension:* literal, inferential, and applied (in the sense of simple transfer) understanding of written expository.

*Operational definition of Conventional Reading Comprehension:* score on Test #6, Conventional Reading Comprehension, of the battery of test factors called ALARM, or Assessment of Language and Reading Maturity, experimental form II (Manzo & Casale, 1979): a conventional recall-based multiple choice question test on two brief passages (approximately 250 words in length, each), established to be of high interest to the intended audience. (This test had a .63 correlation with the Reading section of the Iowa Test of Basic Skills.)

*Conceptual definition of Mature Reading Comprehension:* all of the elements of conventional reading comprehension plus, (1) indications of growth in awareness of the undergirth of precepts which tend to govern much of that which is thought and written, and (2) a willingness and ability to think evaluatively, and in a clear and emotionally unencumbered way, about these.

*Operational definition of Mature Reading Comprehension (MRC):* unweighted combined score of Test #6, General Reading Comprehension; and Test #15, Critical Judgments-Continuous Prose on the ALARM battery. The Critical Judgments-Continuous Prose test requires that judgments be expressed on certain aspects of a continuous passage regarding: (a) the reasonability, judged against one's personal knowledge, of certain expressed views; (b) the general usefulness, or value, of a certain piece of information toward better understanding of the topic of the passage; (c) the internal logic of certain statements, (d) the balance—or denotative/connotative appropriateness—of selected words and phrases. (Score on this test is an index of the extent of agreement expressed by the student with standards established from the responses of a group of mature readers who were forced to reach consensus upon each item.)

## METHOD

### Subjects

Eighty subjects were randomly selected from a medium large, urban, 7-8th grade junior high school. The school

population appeared to be heterogeneous in terms of race, socio-economic background, and intellectual-academic levels.

### Variables

The variables of the study were the 15 test factors composing the ALARM battery. Reliability and validity of the test factors have been established in previous papers, dissertation studies, and articles (Manzo, 1975; Manzo, Lorton & Condon, 1975, 1977; Meeks, Eanet et al., 1976; Robinson, 1977; Martin, 1978). Table 1 displays the intercorrelations among these test factors, and Table 2 lists the correlations of Mature Reading Comprehension (the sum of Conventional Reading Comprehension and Critical Judgments-Continuous Prose) with each of the ALARAM test factors.

### Legend Descriptors, and Brief Descriptions of ALARM Test Factors

1. WrdRec: basic word analysis, or WORD RECOGNITION
2. Vocab: selection of VOCABULARY synonyms
3. Analog: reasoning with basic ANALOGIES
4. SynCpx: translation of sentences of increasing SYNTACTIC COMPLEXITY
5. ModClz: MODIFIED CLOZE passage completion
6. CRC: CONVENTIONAL READING COMPREHENSION as measured by multiple choice
7. GenKnl: GENERAL KNOWLEDGE, or range of facts and information
8. AbstVR: Application of ABSTRACT VERBAL REASONING to interpret proverbs
9. ElbThg: inclination toward ELABORATIVE THINKING
10. SEFac: SOCIAL/EMOTIONAL Factors, primarily appetitive motivation and emotional stability
11. TLRang: breadth of TEACHING/LEARNING RANGE
12. CECComp: degree of CULTURAL/EXPERIENTIAL COMPATIBILITY with expectations of school
13. CJUI: CRITICAL JUDGMENTS—USEFUL INFORMATION, evaluative estimates of the relative usefulness of certain facts and ideas
14. CJR: CRITICAL JUDGMENTS—REASONABILITY, evaluative estimates of the reasonability of certain statements
15. CJCP: CRITICAL JUDGMENTS—CONTINUOUS PROSE, evaluation of various specified elements of continuous prose

**TABLE 1**  
**Intercorrelations for 15 ALARM Subtests and Total ALARM Score**  
**N = 80**

	1	2	3	4	5	6	7	8
1Wrd Rec	1.00							
2 Vocab	.10	1.00						
3 Analog	.06	.03	1.00					
4 SynCpx	— .08	— .16	.03	1.00				
5 ModClz	— .09	.17	.10	.23*	1.00			
6 CRC	.00	.28**	.12	— .11	.23*	1.00		
7 GenKnl	.11	.19*	.14	.20*	.56**	.54**	1.00	
8 AbstVR	— .00	.22*	.14	.73**	.61**	.25*	.65**	1.00
9 Elb Thg	— .13	— .19	— .02	— .21*	— .03	— .03	.00	— .07
10 SEFac	.32**	.35**	.28**	.28**	.30**	.21*	.21*	.26**
11 TLrang	.12	.03	— .04	.13	.03	.11	.09	.08
12 CECComp	.14	— .03	.12	.13	.08	.22*	— .18	.09
13 CJUI	.34**	.44**	.58**	.51**		.50**	.08	.61**
14 CJR	.15	.16	.12	.33**	.31**	.14	.31	.27**
15 CJCP	.17	.26**	.35**	.47**	.45**	.44**	.30**	.53**
ALARM	.36**	.31**	.44**	.51**	.50**	.58**	.21*	.56**

\* $p < .05$

\*\* $p < .01$

9	10	11	12	13	14	15	TOTAL
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**TABLE 2**  
**Correlations of Mature Reading Comprehension (MRC)**  
**with ALARM Test Factors**  
**N = 80**

WrdRed . . . . .	.25	ElbThg . . . . .	.08
Vocab . . . . .	.35	SEFac . . . . .	.31
Analog . . . . .	.42	TLRang . . . . .	.15
SynCpx . . . . .	.57	CEComp . . . . .	.24
ModClz . . . . .	.53	CJUI . . . . .	.46
CRC . . . . .	.68	CJR . . . . .	.49
GenKnl . . . . .	.29	CJCP . . . . .	.96
AbstVR . . . . .	.65	TOTAL . . . . .	.71

**TABLE 3**  
**Multiple Regression Summary For Conventional Reading Comprehension**  
**on ALARM Test Factors**

Variable	Multiple R	R <sup>2</sup>	R <sup>2</sup> Change	Simple R	Beta
AbstVR	.69	.47	.47	.69**	.40
CJUI	.72	.52	.05	.59**	.22
SynCpx	.73	.54	.02	.59**	.20
CEComp	.74	.55	.01	.22*	.11
Vocab	.75	.56	.01	.45**	.13
ElbThg	.75	.57	.01	-.03	.10
CJR	.76	.57	.01	.14	-.12
WrdRec	.76	.58	.00	.37**	.09
Analog	.76	.58	.00	.44**	-.10
CJCP	.76	.58	.00	.44**	.04
SEFac	.76	.58	.00	.21*	.02
ModClz	.76	.58	.00	.50**	-.03
GenKnl	.76	.58	.00	.10	.02
TLRang	.76	.58	.00	.11	.01

\*p < .05

\*\*p < .01

**TABLE 4**  
**Multiple Regression Summary For Critical Judgments-Continuous Prose**  
**on ALARM Test Factors**

Variable	Multiple R	R <sup>2</sup>	R <sup>2</sup> Change	Simple R	Beta
CJUI	.56	.31	.31	.56**	.32
CJR	.70	.49	.19	.54**	.37
AbstVR	.72	.52	.03	.53**	.16
CEComp	.74	.55	.03	.20*	.21
ElbThg	.76	.58	.03	.11	.16
GenKnl	.77	.60	.02	.30**	.19
WrdRec	.78	.61	.01	.17	-.16
SynCpx	.79	.62	.01	.47**	.11
TLRang	.79	.62	.00	.14	.02
Vocab	.79	.62	.00	.26	-.03
GRC	.79	.62	.00	.45**	.04
SEFac	.79	.62	.00	.17	.02

\*p &lt;.05

\*\*p &lt;.01

**TABLE 5**  
**Multiple Regression Summary For Mature Reading Comprehension**  
**on ALARM Test Factors**

Variable	Multiple R	R <sup>2</sup>	R <sup>2</sup> Change	Simple R	Beta
AbstVR	.65	.42	.42	.65**	.27
CJR	.73	.53	.10	.49**	.27
CJUI	.78	.61	.08	.64**	.34
CEComp	.80	.64	.03	.24*	.21
ElbThg	.81	.66	.02	.08	.17
GenKnl	.82	.68	.02	.29**	.17
SynCpx	.83	.69	.01	.57**	.16
WrdRec	.83	.70	.01	.25*	-.10
TLRang	.83	.70	.00	.15	.02
SEFac	.83	.70	.00	.21*	.02
Analog	.83	.70	.00	.42**	-.03
Vocab	.83	.70	.00	.35**	.01
ModClz	.83	.70	.00	.53**	-.01

\*p &lt;.05

\*\*p &lt;.01

## Data Analysis

The delineation of the principle and possible trace elements in Mature Reading Comprehension was conducted primarily through multiple regression analyses using a forward (stepwise) method for inclusion of independent variables. The objective of the analyses was to search for structural relations among the multivariate relationships presented in the ALARM test factors, rather than to select the fewest possible predictors. Therefore, the criterion values established for deciding which variables would enter into the solution were not restrictive. The F ratio of a variable to be entered on the upcoming step was set at .01. The tolerance level (T) was set at .1%. Finally, the number of variables to be entered in the formation of the predictor list was unrestricted except by the F and T levels specified above.

Three stepwise multiple regressions were generated. The first two, for comparison purposes, were of conventional reading comprehension (CRC) with all other ALARM test factors, and of Critical Judgments-Continuous Prose (CJCP) with all other ALARM test factors. The third was of Mature Reading Comprehension (MRC), the alternate construct, with all other ALARM test factors excluding CRC and CJCP which were summed to produce the MRC score).

Interpretation of the data essentially called for an examination of the list of variables generated for best predictors (principle elements); and then for second order predictors which had shown a low level of simple correlation with the criterion variable. It was reasoned that it would be this latter set of predictors which, if these could be isolated, potentially could be called trace elements.

## FINDINGS

Tables 3, 4, and 5 are summary tables for the stepwise multiple regressions performed. Criterion variables are specified as CRC, CJCP, and MRC, respectively. The summary tables list the test factors in the order of their predictive value. The increased correlation at each step is reported along with corresponding variance indices ( $R^2$ ) and size of the variance change at each step ( $R^2$  Change). Simple correlations are listed again in these tables, for convenience, with the Beta index provided as a measure of the size and direction of the effect of individual test factors at each step.

### Criterion Variable: Conventional Reading Comprehension (CRC)

Fifty-eight percent of the variance explaining CRC was found in the ALARM battery, as shown in Table 4, while 47% of this was explained by the test factor called Abstract Verbal Reasoning (AbstVR).

Critical judgment of the "usefulness" of certain statements of information (CJUI) constituted approximately 5% of the remaining variance in CRC. Ability to handle increasing Syntactic Complexity (SynCpx) accounted for an additional 2% of the variance, while Cultural and Experiential compatibility with school (CEComp), Vocabulary (Vocab), Elaborative Thinking (ElbThg), and Critical Judgments-Reasonability (CJR) accounted for the remaining 4% of the variance.

### Criterion Variable: Critical Judgments-Continuous Prose (CJCP)

Seventy percent of the variance of the key factor under study, Mature Reading Comprehension (MRC), could be predicted from 8 of the ALARM test factors. Table 5 indicates that 42% of the variance in MRC could be predicted from Abstract Verbal Reasoning (AbstVR); 10% from evaluation of the reasonability of information (CJR); 8% from evaluation of the usefulness of information (CJUI); 3% from cultural and experiential compatibility with the expectations of school (CEComp); 2% from Elaborative Thinking (ElbThg); 2% from General Knowledge (GenKnl), and 1% each from Syntactic Complexity (SynCpx) and Word Recognition (WrdRec).

The first three best predictors, AbstVR, CJR, and CJUI had high simple correlations with MRC: .65, .49, and .64. The simple correlations of MRC and CEComp, the next best predictor, was markedly lower, at .24, but still statistically significant. The next best predictor, ElbThg, had a simple correlation with MRC of only .08, which was not statistically significant. The last 3 predictors each had a moderate to strong, and significant correlation with MRC: GenKnl, .29; SynCpx, .57; WrdRec, .25.

The first three predictors, AbstVR, CJUI, and SynCpx, had high and statistically significant simple correlations with CRC (.69, .59, and .58). The remaining predictors showed either strong, medium, or no significant correlation with CRC: CEComp, .22; Vocab, .45; ElbThg, —.03; and CJR, .14.

### Criterion variable: Critical Judgments-Continuous Prose (CJCP)

Sixty-two percent of the variance in the Critical Judgments-Continuous Prose test factor (CJCP) could be predicted from 8 of the 14 other ALARM test factors, as shown in Table 5. 50% of this variance could be predicted from the two other tests of critical judgments: 31% from Critical Judgments-Useful Information (CJUI), and an additional 19% from Critical Judgments-Reasonability (CJR). These two test factors had high simple correlations with CJCP (.56 and .54).

The three next best predictors of CJCP each accounted for approximately 3% of its remaining variance. These were Abstract Verbal Reasoning (AbstVR), Cultural/Experiential Compatibility (CEComp), and Elaborative Thinking (ElbThg). AbstVR had a high simple correlation with CJUI (.53), while CEComp and ElbThg each had relatively low simple correlations with CJUI (.20 and .11).

The remaining 4% of the variance accounted for was associated with General Knowledge (GenKnl), Word Recognition (WrdRec) and Syntactic Complexity (SynCpx). These predictors showed either strong, or no significant, correlation with CJCP: GenKnl, .30; WrdRec, .17; and SynCpx, .47.

## RESULTS

The principle elements in Mature Reading Comprehension, as revealed in junior high school students, were Abstract Verbal Reasoning (AbstVR), Critical Judgments-Reasonability (CJR), and Critical Judgments-Useful Information (CJUI). Abstract Verbal Reasoning also was the single best predictor, or principle element, of Conventional Reading Comprehension, followed by CJUI. The principle elements in Critical Judgments-Continuous Prose were the other critical judgments test factors, CJUI and CJR.

The trace elements revealed in Mature Reading Comprehension were: Cultural/Experiential Compatability (CEComp), Elaborative Thinking (ElbThg), General Knowledge (GenKnl), Syntactic Complexity (SynCpx), and Word Recognition (WrdRec). Each of these elements also had some discrete predictive power, at low levels (.03-.01%), for Conventional Reading Comprehension (CRC) and for Critical Judgments-Continuous Prose (CJCP). The levels of contribution of these trace elements changed places in slight, though potentially significant ways. Most notably, SynCpx was the third best predictor in CRC, the eighth in CJCP, and the seventh in MRC.

## DISCUSSION AND CONCLUSIONS

Abstract Verbal Reasoning was the best predictor of both Mature Reading Comprehension and Conventional Reading Comprehension. This basic thinking factor appears to be a form of thinking which is compatible with, though in significant ways distinct from critical-evaluative thinking. One form or another of the three critical judgments tests of evaluative thinking emerged as a principle element in MRC, and CRC.

This critical-evaluative-thinking factor in comprehension appears to be a form of awareness of the undergirth of factors, or precepts, which tend to govern much of what is written and thought. It appears to resemble strongly the Comprehension Subtest of the Wechsler Intelligence Scales for children and adults which is said to measure practical judgments, social acculturation, and maturing conscience or moral sense (Glasser & Zimmerman, 1967).

From a purely logical point of view, reading comprehension seems to make more sense when conceptualized, assessed and taught as a compound factor such as was represented by the addition of Critical Judgments factors to CRC. Most any educator, for example, could have written the following: "The pupil must constantly read to evaluate. The good comprehender is a critical reader. He checks the truth, logic, reliability, and accuracy of what is written . . . He relates the material to his experience. He distinguishes fact from fiction . . ." (Dechant, 1965). In short, when an educator refers to comprehension, the reference is to the breadth of it. It should not be necessary to qualify it by calling it Mature Reading Comprehension, the qualification more appropriately might be reserved for reference to anything less than this.

Cultural/Experiential Compatibility, Elaborative Thinking, and General Knowledge were, upon reflection, concluded to be the *important* trace elements in progress toward mature reading comprehension for junior high students. The reasoning behind this selection fell into two categories. (1) The presence of the CEComp and General Knowledge factors was a re-affirmation of several prior sociological, psychological, and educational studies which say that there is a fund of experiences and facts which sometimes appear to be non-critical in a given situation, though which become major predictors over the long term of academic,

social, and reading-language development; e.g., magazines received in the home, and knowledge of seemingly trivial facts and allusions. And (2) the discovery of the trace element Elaborative Thinking seemed a new and pregnant disclosure, with a certain logic to support its potential long term value as well: while divergent thinking might cause an individual to digress from the strict letter of the printed page, it could be argued that this is the sort of thinking which leads to the forming of ideas, sound judgments, heightened curiosity, and unwitting commitment to continual, or life-long, learning . . . assuming of course that there is an adequate level of comprehension and that the digressions do not constitute a chronic form of emotional disruption.

The isolation of these trace elements in Mature Reading Comprehension serves, at this point, as a benchmark in the study of reading maturity. There has been a certain degree of circularity in this extraction of elements which were entered into a battery of tests with a preformed rationale. Even so, these results still are perhaps less redundant than those drawn solely from analyses of a simple recognition-recall test. They have provided support from the proposed analog of trace elements, which may prove to have profound implications for in-depth reading diagnosis and selection of reading methodologies.

It is interesting, as a supportive aside, that Modified Cloze, a traditionally high correlary of conventional comprehension, was a relatively inconsequential factor in prediction of Mature Reading Comprehension. This is not surprising, since it has been established previously that cloze performance is not a significant factor in the comprehension of meaning (Godfrey Culver, et al., 1972), but more so is a measure of awareness of language redundancy patterns (Weaver and Kingston, 1963), a factor which probably has a clear optimal value, and, therefore, a period when it probably is best taught, thereafter being useful for quick measurement purposes, but non-productive as an instructional intervention strategy.

The use of cloze for the measurement of CRC was justified solely upon its high correlations with CRC. Cloze did not correlate well with more profound measures of meaning and other related reading factors; it also proved to be of little value in the improvement of reading comprehension (Martin, 1967). Critical Judgments Continuous Prose (CJCP), however, is highly correlated with CRC (.68), and MRC (.96), as well as with other significant reading factors. On this basis, it appears as if CJCP might be as appropriate for measurement, and more promising as an intervention strategy, for general reading comprehension.

It appears, in conclusion, that one major obstacle to the more profound understanding of reading comprehension has been a certain timidity in stating what it is which needs to be combined to represent the construct more properly. The tendency has been to overvalue factors which correlate highly with conventional reading comprehension and to undervalue or dismiss those which do not. Other, more logically based, methods seem to be necessary as well. In short, the study and understanding of reading comprehension probably will progress better if we select task(s) to represent it which are more sympathetic to the complexities of the process.

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## PROCEDURES

### Subjects

The subjects for this study were 101 elementary school teachers (grades 1-5) and 46 secondary school teachers (6-12). These teachers were employed in schools that can be categorized as rural, suburban, urban and inner-city.

### Instrument

The questionnaire utilized in the study consisted of eight definitions of reading comprehension. Each definition represented a specific and identifiable school of thought. These eight definitions were randomly ordered on the questionnaire and brief instructions were given asking for a ranking with one representing the definition with which there was most agreement and eight representing the definition with which there was least agreement. The author and school of thought were not included.

Definitions and the schools of thought they represent are:

1. Kenneth Goodman—psycholinguistic model. Reading comprehension is a selective process. It involves interaction between language and thought that uses the most productive cues to produce guesses which are right the first time. (Singer & Ruddell, 1970)
2. Wayne Otto—skills approach model. Reading comprehension consists of separately distinguishable comprehension skills which can be taught in the classroom. (Otto, 1977)
3. M. C. Wittrock—generative model. Reading comprehension is when the reader generates from memory one or more representations of an event consistent with the words of the sentence. (Wittrock, 1975)
4. Phillip Gough—information processing model. Reading comprehension is a precise processing of information. It involves exact, detailed, sequential perception and identification of letters, words, spelling patterns, and large language units. (Singer & Ruddell, 1970)
5. George Miller—chunking model. Reading comprehension consists of analyzing small semantic units into larger semantic units instead of vice-versa. (Singer & Ruddell, 1970)
6. Jack Holmes—substrata factor model. Reading comprehension is a reasoning process in which various thinking skills interact in a hierarchical pattern. (Singer and Ruddell, 1970)
7. Russell Stauffer—intellectual functions model. Reading comprehension is an intellectual process much akin to thinking and therefore represents a way of making predications based on evidence presented. (Singer and Ruddell, 1970)
8. Robert Ruddell—communication model. Reading comprehension is the same as language comprehension. (Singer & Ruddell, 1970)

## METHOD

Questionnaires were distributed to members of six graduate reading classes at North Texas State University. These teachers were asked to complete the questionnaire and to have additional teachers in their schools complete the questionnaire. The questionnaire was also distributed randomly throughout one local metroplex school district. One hundred forty-seven usable questionnaires were returned.

The definitions were then rank ordered and percentages of responses calculated.

## CURRENT RESEARCH AND ANALYSIS OF DEFINITIONS OF COMPREHENSION

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The subject of comprehension is one which is generating considerable attention in the field of reading. The first annual meeting of the American Reading Conference was devoted entirely to the consideration of comprehension, both process and product; the Center for the Study of Reading at the University of Illinois has produced a large body of literature centered around the study of comprehension; and, the *Annual Summary of Investigations Relating to Reading* (1980) reports numerous studies conducted by individuals on various aspects of comprehension.

In her report of a recent observational study, Durkin (1979) began by commenting on her inability to locate an adequate definition of comprehension instruction. Because of this lack of a definition, she constructed one upon which she based her research. Based on her definition, Durkin concluded that: 1. practically no comprehension instruction was done in classrooms and that comprehension assessment was the predominant activity; 2. that teachers neglected comprehension because they were too busy teaching phonics, structural analysis, or word meanings, and; 3. that teachers were assignment givers and checkers.

Hodges (1980) has taken issue with Durkin's definition of comprehension instruction as well as with the way she operationalizes it for categorizing teacher behavior. Hodges agrees that the definition should be limited, but states that it must be broader than that created by Durkin (1979).

Operational definitions of comprehension instruction are based on theoretical definitions of reading comprehension. A variety of theoretical definitions exist that represent diverse schools of thought. The purpose of this study was to determine whether a particular definition or definitions of reading comprehension were widely held by teachers at the elementary and secondary school levels. Additional research, to be reported later, will examine the correlation between teachers' stated beliefs about reading comprehension and their observed teaching practices.

## RESULTS

Responses of the 101 elementary teachers were tallied. Perusal of Table 1 reveals that there was only one definition (#5) that received no first place ranking. Definition #8 received the greatest number of "least agreement" rankings. The results were widely distributed across rankings and definitions.

Table 1

Rank Order Tally of Definitions by Elementary Teachers									
Rank	Definitions								
	1	2	3	4	5	6	7	8	
1	5	3	18	23	0	28	21	3	
2	11	5	13	9	3	23	29	8	
3	18	5	15	14	8	19	18	4	
4	17	12	24	10	9	10	12	7	
5	16	23	10	11	16	8	9	8	
6	12	18	10	13	23	7	5	13	
7	9	15	5	12	30	5	5	20	
8	13	20	6	9	12	1	2	38	

n = 101

Responses of the 46 secondary teachers were tallied. Perusal of Table 2 reveals that there were two definitions (#2 and #5) that received no first place rankings. Definition #5 also received no second place rankings. Definition #8 received the greatest number of "least agreement" rankings. Definition #7 received no "least agreement" rankings. The results were widely distributed across rankings and definitions.

Table 2

Rank Order Tally of Definitions by Secondary Teachers									
Rank	Definitions								
	1	2	3	4	5	6	7	8	
1	7	0	4	4	0	13	16	2	
2	10	1	5	5	0	8	16	1	
3	7	3	8	8	4	8	5	3	
4	8	2	13	7	3	5	4	4	
5	6	9	5	6	13	5	1	1	
6	2	10	4	7	10	3	2	8	
7	4	13	4	1	12	2	2	8	
8	2	8	3	8	4	2	0	19	

n = 46

Responses of the 147 teachers were jointly tallied. Perusal of Table 3 reveals that there was one definition (#5) that received no first place ranking. Definition #8 received the greatest number of "least agreement" rankings. The results were widely distributed across rankings and definitions.

Table 3

Rank Order Tally of Definitions of All Teachers									
Rank	Definitions								
	1	2	3	4	5	6	7	8	
1	12	3	22	27	0	41	37	5	
2	21	6	18	14	3	31	45	9	
3	25	8	23	22	12	27	23	7	
4	25	14	37	17	12	15	16	11	
5	22	32	25	17	29	13	10	9	
6	14	28	14	20	33	10	7	21	
7	13	28	9	13	42	7	7	28	
8	15	28	9	17	16	3	2	57	

n = 147

Rank orders and percentages of definitions were determined for specific categories within the sample.

The responses of elementary teachers were rank ordered by first choice; first and second choice combined; and first through fourth choices combined. Definition #6 ranked first in all three categories. Definition #4 ranked second in total ranking, while definition #7 ranked second in the combination of choices. Definition #5 ranked last in all three categories.

The responses of elementary teachers were rank ordered by first choice; first and second choice combined; and first through fourth choices combined. Definition #6 ranked first in all three categories. Definition #4 ranked second in total ranking, while definition #7 ranked second in the combination of choices. Definition #5 ranked last in all three categories.

The responses of secondary teachers were rank ordered by first choice; first and second choice combined; and first through fourth choices combined. Definition #7 ranked first in all three categories. Definition #6 ranked second in all three categories. Definition #5 ranked last in all three categories.

The responses of all teachers were rank ordered by first choice; first and second choice combined and first through fourth choices combined. Definition #6 ranked first in total ranking. Definition #7 ranked first in both combination rankings. Definition #7 ranked second in total ranking while definition #6 ranked second in both combined rankings. Definition #5 ranked last in all three categories.

Definitions #6 and #7 were ranked first or second in eight of the nine categories. Definitions #2 and #8 were ranked sixth or seventh in all nine categories. Definition #5 was ranked eighth (last) in all nine categories.

Definition #6 was ranked first by 28% of the elementary teachers, 28% of the secondary teachers, and 28% of all teachers. Definition #6 was a first or second choice of 51% of the elementary teachers, 46% of the secondary teachers, and 49% of all teachers. Definition #6 was one of the first four choices of 80% of the elementary teachers, 74% of the secondary teachers, and 78% of all teachers.

Definition #7 was ranked first by 20% of the elementary teachers, 35% of the secondary teachers, and 25% of all teachers. Definition #7 was a first or second choice of 50% of the elementary teachers, 70% of the secondary teachers, and 56% of all teachers. Definition #7 was one of the first four choices of 80% of the elementary teachers, 89% of the secondary teachers and 82% of all teachers.

There is a distinct and discernible pattern of stated preference for definitions of reading comprehension. This pattern is supported by both rank order choices and percentage of teachers choosing each definition. This pattern holds constant across all nine categories.

### DISCUSSION

It is obvious that patterns of stated preferences for theoretical definitions of reading comprehension exist. These patterns are similar for elementary and secondary teachers, and so would seem to be representative of teachers in general.

The most often chosen two definitions represent Stauffer's intellectual functions model and Holmes' substrata factor model. These definitions are similar in that they equate or compare reading to an intellectual or reasoning process much akin to thinking. If one's operational definition were to follow from one's theoretical definition, it would seem that the majority of teachers would be conducting their reading classrooms in a thinking mode with a high priority placed on prediction.

The least chosen two definitions represent Miller's chunking model and Otto's skills approach model. These definitions are also similar in that they seem to represent an isolated skills approach to reading comprehension. If one's operational definition were to follow from one's theoretical definition, it would seem that the majority of teachers would avoid isolated skills as well as the process of working with small parts of language rather than ideas.

The pertinent question seems to be whether, in fact, one's operational definition derives from one's theoretical definition. Research (Durkin, 1979; Kurth & Greenlaw, 1980) seems to disprove this. Durkin reported that an unusual amount of time was devoted to assignment giving and checking and little time to development of comprehension. This behavior would not seem to represent a belief in definitions #6 or #7. Kurth and Greenlaw reported that the majority of time (35%) in formal reading instruction was spent on phonics and structural analysis skills. This was true as an average percentage of grades, K, 2, 4, and 6. Very little discussion or interaction from child to child occurred in the classes that were observed. This behavior does not seem to represent a belief in a thinking, intellectual mode of reading instruction.

Why are teachers behaving in a manner that seems to reflect the philosophies they rank as least agreeable? One reason might be that, though teachers want to think of themselves as developing thinking skills, this method requires constant attention, flexibility and planning. Each group and individuals within the group will respond differently, and time is a necessary ingredient. It is much easier and faster to whip through a set pattern determined by the editors of a basal program. Being human, teachers have lofty ideals, but fall prey to the daily grind.

A second possibility is that, though teachers believe in teaching thinking skills, the majority of reading achievement and competency tests seem to test isolated skills. A concern for test-taking appears to rule teaching behavior.

Whatever the cause for this bi-polar behavior, it would seem reasonable to suggest that teachers closely inspect their stated beliefs in reading comprehension, determine schemes for implementing their beliefs, and teach in a manner that is consistent with their beliefs.

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## **RESEARCH AND PRACTICES IN COMPREHENSION INSTRUCTION IN ELEMENTARY CLASSROOMS**

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The purpose of this observational study was to describe the comprehension instruction which occurs during formal reading classes in elementary schools. Previous research investigating classroom comprehension instruction has generated a concern about the quality and quantity of such instruction. After conducting an extensive observational study, Durkin (1979) reported that: a. practically no comprehension instruction was done in classrooms and that comprehension assessment was the predominant activity; b. that teachers neglected comprehension because they were too busy teaching phonics, structural analysis or word meanings, and; c. that teachers were assignment givers and checkers.

Hodges (1980), however, has questioned both Durkin's definition of comprehension and the way in which she operationalized it in her scheme for categorizing teaching behavior. The present investigation was designed to provide more direct observational data about reading instruction in order to determine the validity of Durkin's findings.

The research design used in this study differed from that used by Durkin in two major respects. First, because Durkin's definition of comprehension was generally criticized as too narrow and confining, the definition of comprehension instruction was broadened. Also, teachers from four grade levels in elementary schools were observed rather than having observations from only one grade level as Durkin did.

### **PROCEDURE**

#### **Subjects**

The subjects for this study were 16 certified elementary classroom teachers, 4 each from grades kindergarten, 2, 4, and 6. Each of the teachers was chosen randomly from a pool of all grade level teachers in a suburban school district in Texas. Each teacher randomly selected was asked to participate in the study. It had been planned that if a teacher refused to participate, an alternate would be chosen. However, all of the first 16 teachers selected agreed to participate in the study.

## Observation Schedule

Each of the 16 teachers was observed during three 60 minute periods during the regularly scheduled reading classes. Because reading classes were longer than an hour, the observation times were scheduled to sample each section of the reading periods. The observations were made on three successive school days, with almost all of the observations done on either a Monday, Tuesday, Wednesday, or a Tuesday, Wednesday, Thursday cycle. A total of 48 hours of observation time was included in the study.

The observations were made by two university faculty members and two doctoral students in reading education. The use of four observers made it possible to have each teacher observed by three different researchers. All observations were made between October 20, 1980 and November 14, 1980.

## Observation Instrumentation

The observation instrument used in this study was a modification of that used by Durkin in her 1979 study. Because the researchers felt that the comprehension instruction category defined by Durkin as "the teacher does something to help one or more children understand more than a single word" was too vague, nine specific categories include:

1. Comprehension instruction/assignment checks—Teacher says or does something to help one or more students understand more than a single word by directing an activity in which he/she checks a class or homework assignment by explaining wrong answers, expanding on correct answers, questioning, discussing the assignment.
2. Comprehension instruction/application—Teacher says or does something to help one or more students understand more than a single word by directing an activity which provides practice of concepts previously taught. (Ex. questioning, discussion.)
3. Comprehension instruction/helps with assignment—Teacher says or does something to help one or more students understand more than a single word by assisting one or more students with an assignment that focuses on comprehension of connected text. (Ex. asking questions, suggesting that parts be reread, asking for paraphrases.)
4. Comprehension instruction/prediction—Teacher says or does something to help one or more students understand more than a single word by directing one or more students to predict outcomes in text or verbal discourse.
5. Comprehension instruction/preparation—Teacher says or does something to help one or more students understand more than a single word by preparing one or more students to read text through directing attention to vocabulary, eliciting children's experiences, or attempting to motivate the children.
6. Comprehension instruction/strategies—Teacher says or does something to help a student understand more than a single word by giving specific information on how to identify a main idea, find a topic sentence, skim a paragraph, locate information, etc.
7. Comprehension instruction/review—Teacher says or does something to help one or more students understand more than a single word by reviewing or repeating earlier instruction.
8. Comprehension Assessment—Teacher asks questions to determine comprehension of connected text.
9. Comprehension/gives assignment—Teacher gives an assignment which will require students to understand connected text.

The other categories included in the observation instrument were the same as those used by Durkin. The general categories used included phonics and structural analysis, silent reading, oral reading, teacher reads aloud, transitional activities, and non-instructional activities.

The observational focus was the specific teacher behavior during reading instruction. The observed behavior was coded by the observer and the recordings were made in terms of real time by seconds. This procedure made it possible to analyze total time spent on specific activities and to determine percentages of instructional time devoted to specific teaching activities.

## Observer Training

All four observers had participated in the rewriting of the observation instrument. Therefore, each observer was already very familiar with the coding system used on the instrument. However, in order to ensure observer consistency in coding behaviors, twenty hours of training time were spent observing video tapes and actual classroom reading lessons. After the observations were completed, observers' codings were compared and discussed until uniformity of coding was achieved.

## RESULTS

After the observations were completed, a summary sheet which listed the amount of time spent in each of the various instructional activities was compiled for each subject. The percentage of total reading classtime spent in each activity was also calculated. The summary sheets for each teacher were then compiled into summary sheets for each grade level. The specific observation reports were also studied in order to determine specific patterns of teaching activity.

The analysis of the summary sheets compiled from all of the grade-level reports showed that an average of 32% of the instructional time during the formal reading instruction was spent in some form of comprehension instruction; 35% of the instructional time was spent in teaching phonics and structural analysis; 8% of the time was spent in silent reading; 4% of the time was spent in oral reading; 2% of the time the teacher read to the children; and 19% of the time was spent in transitional and non-instructional activities.

When the results were analyzed by grade level, it was found that in sixth grade 49% of the instructional time was spent in comprehension activities; 18% of the time was spent in phonics and structural analysis; 12% of the time was spent in silent reading; 2% of the time was spent in oral reading; and 19% of the time was spent in non-instructional activities.

At the fourth grade level, 44% of the instructional time was spent in comprehension activities; 20% of the time was spent in phonics and structural analysis; 9% of the time was spent in silent reading, 3% of the time was spent in oral reading; and 24% of the time was spent in non-instructional activities.

At the second grade level, 31% of the instructional time was spent in comprehension activities; 32% of the time was spent in phonics and structural analysis; 11% of the time was spent in silent reading; 13% of the time was spent in oral reading; and 13% of the time was spent in non-instructional activities.

At the kindergarten level, 3% of the instructional time was spent in comprehension activities; 68% of the time was spent in phonics and structural analysis; the teacher read aloud 9% of the time; and 20% of the time was spent in non-instructional activities.

Because the major focus of the study was comprehension instruction, an analysis was also made of the specific types of comprehension instruction used by teachers. The results of the comprehension analysis showed that teachers spent 919 of the 2,880 minutes teaching comprehension.

The comprehension categories coded in the study were Comprehension Assessment, Comprehension Assignment, Comprehension Application, Comprehension Aid on Assignment, Comprehension Review, Comprehension Prediction, Comprehension Preparation, Comprehension Strategies, and Comprehension Assignment Check.

Of the 919 minutes of comprehension teaching, 186 minutes of instruction were classified as Comprehension Assessment; 179 minutes were classified as Comprehension Application;

134 minutes were classified as Comprehension Assignment Check; 108 minutes were classified as Comprehension Aid on Assignment; 104 minutes were classified as Comprehension Strategies; 70 minutes were classified as Comprehension Assignment; 65 minutes were classified as Comprehension Preparation; 51 minutes were classified as Comprehension Review; and 22 minutes were classified as Comprehension Prediction.

The percentage of total comprehension instruction time for each comprehension category was also calculated. The largest percentage of teaching time was devoted to Comprehension Assessment (20%). Comprehension Application was taught 19% of the time; Comprehension Assignments were checked during 15% of the time; Comprehension Aid on Assignments was given 12% of the time; Comprehension Strategies were taught 11% of the time; Comprehension Assignments were given during 8% of the time; Comprehension Preparation was done 7% of the time; Comprehension Review was done 6% of the time; and Comprehension Prediction was taught 2% of the time.

## DISCUSSION

The first major finding of this study was that teachers spend an average of 32% of formal reading instruction classtime teaching comprehension. Also, the amount of comprehension instruction increases substantially as the grade level increases. However, the extremely small percentage of comprehension instruction at the kindergarten level is a cause for concern. Even though kindergarten teachers in the study cited comprehension as an important part of the reading process, they did not implement this belief into the formal reading instruction. It would seem difficult for beginning readers to understand that the purpose of reading is to obtain meaning unless meaning is stressed by their teachers as they begin learning to read.

While 32% of the formal instruction was comprehension oriented, the majority of the time was spent on phonics and structural analysis skills. Even in 6th grade, when the bulk of these skills are already learned, teachers spent 18% of the classtime on phonic and structural analysis skills, and the average percentage of time spent on these skills was 35%. Thus, the results of this study agree with the finding of Durkin that teachers are very busy teaching phonetic analysis.

The study also showed that silent reading is done by children only about 8% of the time in formal reading instruction. If children do not read outside of the reading group, they have very little opportunity to practice reading to attain the automatic levels required by mature reading. It would seem logical that in the reading period some provision would be made to provide substantial amounts of practice in the skill of silent reading.

Another major finding of this study is that teachers feel most comfortable when teaching comprehension through assessment. Of the specific comprehension categories coded in the study, comprehension assessment, followed closely by comprehension application, was the major category taught. On the teacher questionnaire, teachers felt very strongly that assessment was a particularly effective method for teaching comprehension, and their classroom practices evidenced this belief. Also, the assessment was primarily teacher directed.

A distinct difference could be seen in the approach used by teachers when teaching comprehension skills as compared to the approach used when teaching word recognition skills. In most instances, when a teacher was focusing on a phonetic skill, a period of direct instruction was used during which time the teacher explained specific strategies for the particular phonetic skill being taught. Then an assignment was given and

the children proceeded with the task. Thus these lessons were coded as phonics strategy followed by phonics assignment followed by phonics application. However, during comprehension instruction, teachers rarely used comprehension strategies instruction; the most often coded pattern was comprehension assignment followed by comprehension application.

This finding of the study that teachers do not use direct instruction in comprehension strategy is substantially the same finding as Durkin reported and classified as "mentioning". When faced with teaching a comprehension task, teachers generally "mentioned the skill" which they wanted the children to learn with a cursory overview such as, "We're going to read these exercises to try and find some main ideas." Then children were asked to do the task immediately with no further instruction. Then as children did the assigned task, the teacher helped those students having difficulty with specific items on a one-to-one basis.

This typical lesson pattern was the probable cause for another major finding of the study that most comprehension instruction is done on a one-to-one basis. Teachers were more apt to discuss comprehension strategies with individual children having difficulty with specific items than to discuss comprehension strategies in whole group settings. This tendency also led to highly inflated comprehension percentages. For example, in one typical lesson a teacher was coded as spending 36 minutes in teaching comprehension application, but these 36 minutes were spent in discussions with 12 individual children, so that each child received an average of approximately 3 minutes of instruction.

In summary, when teachers teach comprehension they use two primary methods, one being the use of comprehension assessment after portions of text are read, and second, the use of discussions with individual pupils.

All of the reading classes observed, from kindergarten through sixth grade, used homogeneous grouping by ability for the reading instruction. All classrooms were divided into three reading groups. However, even though the classes were divided by ability levels, in most instances, the teacher taught the same lesson to each group with no modification in either content or methodology for the particular group. (In fact, one student who reported to his teacher that he knew the correct answer to a workbook question because he had listened in on the first group was chastised for listening to someone else's instruction.) Thus, it must be concluded that teachers do not use grouping to modify lessons for the levels within the group—rather it appears to be a procedure of habit.

The widespread use of grouping also seems to affect reading instruction in another way. All of the classes observed used a substantial portion of the classtime for transitional activities. The typical 60 minute observation found teachers using an average of 19% of this time for transitional and non-instructional activities. These relatively high amounts may have occurred because of the need to move three groups of children around the room each period. If grouping is not going to be used to improve individual instruction, it may only serve to use up valuable instructional time. The 19% figure for non-instructional activities points up clearly the need for effective pre-service and in-service training in classroom management skills. There was a great deal of variance from teacher to teacher in this category, thus pointing out that individual patterns of classroom management do affect the quality of instruction.

An incidental finding of the study concerned the teacher's stated objectives for lessons. For the most part, the objectives stated for the comprehension sections of the lessons were very vague. In many instances the teachers reported that the aim of

their lesson was to "read the story in 'Rainbows' and do the workbook." Teachers were much more apt to have specific objectives when teaching specific phonics, structural, or word meaning objectives. It may be that, as Lanier and Floden (1979) report, teachers need help in having research knowledge translated into articulate sets of curricula. This need appears to be especially great in the area of reading comprehension.

Because of the broad definition of comprehension used in this study, the percentage of time reported as spent in comprehension instruction was significantly greater than that reported by Durkin. However, many of the instructional patterns reported by Durkin were evident in the classrooms observed in this study, and her major conclusion that very little direct instruction of comprehension is being done in elementary classrooms is substantiated by this study.

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## What Approaches Do We Question or Reject

We reject the notion of teaching students a series of isolated reading skills for the following reasons. Lists of reading skills may range from a few broad categories to hundreds of specific and detailed items. Lennon (1960) summarized approximately 30 studies and categorized all of the skills which were found in these studies into four essential components:

1. A verbal factor which is closely related to the knowledge of the vocabulary
2. Understanding literal meaning and the ability to follow directions
3. The ability to infer latent meanings and to predict outcomes
4. An appreciation of reading (for example, being able to see the purpose, judge tone, etc. . .)

Other lists, such as one by Herber (1970), may name 100 or more components of the reading process. Nearly every reading educator has a list of reading skills and each is different. The reason is obvious—skills overlap, and it is sometimes impossible to confine a skill to a single category. For example, taking notes may be defined as a study skill; yet a student cannot take good notes unless he/she can first ferret out the main ideas; and is not finding the main idea a comprehension skill? Palmer (1975) sees as a pitfall for the content area teacher the "tendency to teach reading as if this highly complex mental activity is little more than a bag of devices." When a student reads for meaning, he may read for many purposes at once, so that reading comprehension must involve more than just the systematic progression through sequential and cumulative levels.

We strongly question the notion of the reading teacher and content area teacher sitting down and trying to identify a set of specific skills that are requisite for mastering specific subject area materials. This procedure, even if it has face validity, has two serious drawbacks: (1) such a list of skills leads teachers to believe that skill-related activities can teach students to read the assignment; and (2) there is seldom an observable correlation between acquisition of such skills and improved reading in the content area.

## Turning To Active Reading Behaviors

The active reading behavior approach is an alternative to the two approaches we have just described. This approach focuses on the products of reading, not skills to be mastered prior to reading. For example, a social studies teacher may want students to summarize two different editorials. By focusing on what outcome the teacher wants, strategies can be developed and employed to assist students while going through the editorials to arrive at the point where they can effectively summarize.

We feel this approach is different in several ways. First, this approach looks for observable proof of reading comprehension that is acceptable to the content area teacher. Second, active reading behaviors offer better indicators of student's knowledge of the material than end of unit examinations or standardized tests. Third, the product of an active reading behavior is something the content area teacher can teach a student to produce; and fourth, students who practice active reading use other language skills of listening, writing, and speaking and thus the student integrates a full language repertoire as meaning is made during the reading process.

In addition, this approach allows teachers to be more specific about what they need to do in order to help students with reading the material. For example, rather than teachers

## ACTIVE READING BEHAVIORS: A PRODUCT CENTERED APPROACH TO COMPREHENSION

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What is an active reading behavior you might ask? Is this a new term for some old reading concept or is this a new approach for teaching reading at the secondary level? We feel it is a synthesis of the old and new. Active reading behaviors result in desired products of reading and reading related activities. For example, we look at "identifying an unknown word" as an active reading behavior. Davis (1968) in his factor analytic studies found that knowledge of vocabulary is one of the two most important factors in reading and understanding written materials. Our explanation of identifying unknown words involves having the students actively tag and work with unknown vocabulary words when they encounter them. We do not focus on teaching a series of skills such as syllabication, roots, affixes, and so forth, hoping that these skills will transfer when the student encounters new or difficult vocabulary. Rather we focus upon those products of reading that teachers will accept as evidence that the material is being read and students are gaining meaning from the material. This follows Goodman's model of reading that looks at meaning as the end product of the reading process.

stating, "Oh, my kids cannot read," they might begin to say or admit that their students cannot "paraphrase" very well or "ask pertinent questions" about a reading selection. These products of active reading would appear to be more manageable and remove some of the mysticism from the teaching of reading in the content areas.

### WHY IS THERE A NEED FOR A DIFFERENT APPROACH

We are seeing a heightened awareness among content area teachers of the importance of reading. More importantly, this awareness includes a recognition of the content areas as a place for learning to read content material. More and more teachers are accepting a responsibility for providing activities which will maximize each student's *potential* for comprehending a reading assignment. However, this is a responsibility for which many teachers feel they are inadequately prepared. The following problems are of special concern.

#### Differences Between Students

The reading abilities of students in any given content classroom may vary from extensive to non-extant, and a teacher knows that a reading assignment is meaningless for a student who cannot gain meaning from it. The alternatives for the teacher are: (1) to use other media, such as lecture and films; or (2) to teach the student to read. Without adequate preparation, the teacher must opt for the former. Background experiences in the subject may also vary considerably; new learning is built upon old, and we cannot assume that every student who comes into a class has previous knowledge and/or skills upon which new learnings can be based. For those who do not, a reading assignment can be an exercise in futility.

#### The Problem of Transfer

Reading and study skills may be carefully taught in the reading class but they are not automatically transferred from the laboratory or clinic to the situation where they are to be used. As Richard Castillo (1976) said,

A simulated lesson on how to take notes in English class is likely to produce students who are very competent at taking notes in simulated environments.

The problem is one which concerns nearly every reading educator. In *Everybody Into The Pool*, Howard Miller (1975) states,

The skills they (students) learn in reading class never leave the room, and the students remain lost and confused in handling printed material of other subject. . . . There is a need, then, to convince the content area teacher that there are methods and materials which make the teaching of reading an integral part, rather than a separate function, of the content work.

#### From Narrative to Expository

Even for students who read well a text in a particular subject area may require some specialized knowledge of skills for which they are not prepared. At the primary level, teaching of reading is often limited initially to decoding skills. The reading material used is narrative in style, and the vocabulary is non-technical. As these students move into the intermediate and secondary grades, they are faced with expository writing style, content specific vocabulary and a wealth of new concepts. The change from "learning to

reading (decode)" to "reading to learn" is a tremendous step for these readers, and one for which many are not prepared.

#### Teachers Are Not Prepared

Content area teachers, when told that "every teacher must be a teacher of reading," are often angry and frustrated. Until now, content area teachers usually have viewed reading as a separate subject having its own set of skills, teaching techniques and terminology which endowed the term "reading" with a special "mystique." "Only reading teachers know how to teach reading," they imagine. Many view this new requirement as an intrusion on their time. Others, familiar with the "swings of the pendulum" in education, wait patiently for the responsibility to go away. Even those who are willing to accept the responsibility for providing reading instruction to their students often are worried. They assume that before they can help students learn to read, they must be trained as reading specialists, an assumption which is bound to make them become apprehensive about the acceptance of this new role.

#### HOW DID WE SELECT ACTIVE READING BEHAVIORS

Over the years we have had contact with public school secondary content-area teachers. We have been one of them; we have worked within their classes; we have provided them with inservice training and we have taught them required undergraduate and graduate courses in secondary reading. Through these years we have also been barraged with competency based education and goal directed training rhetoric. One common cry coming from all these encounters has been teachers claiming, "My kids cannot read."

Early on we danced around this statement by either telling the teachers they were generalizing or making an overstatement. We followed that up with demonstrations that being able to read is relative to what is being read and admonitions such as "your kids can read something, and it is your job to help them read your difficult material."

After a few sessions of these and other "attitude adjustment" activities, we typically moved on to give them more knowledge about the reading process. Then a number of "how to diagnose and prescribe" activities were followed by a series of suggestions on how to teach a few skills.

In short, we taught teachers about secondary reading and never really heard their first cry—"My kids cannot read." As a result, much of our instruction fell on deaf ears. After years of agonizing over our teachers' ineptness, (really our own), we began to ask a measurement question—"How do teachers know their kids can or cannot read?" We knew teachers seldom used standardized tests, and we knew teachers were frequently asked to judge reading performance of students. This led us to ask, "What do teachers accept as the evidence that kids are reading?" and thus "What do kids as readers need to do?"

This led us to develop a list of answers. Items on the list included the following: ask questions, verify what is there, paraphrase, predict what is, visualize, see relationships; e.g., cause, effect, specific or general, implicit or explicit, relate ideas to the here and now, convert visuals to narrative, exhibit levels of thinking such as analysis and synthesis, determine meaning from context, answer questions, reread, recite, summarize, psyche out writer's style, determine author's purpose and point of view, attend to topographical signals, label propaganda/fact/opinion, vary rate, share meaning, assimilate.

Upon examination of our own cryptic list, we realized it was a mix of traditionally accepted reading skills, poor descriptions of psychological processes that may go on in the minds of readers and some outward behavior that may be evidence of skill attainment or the psychological processes.

At this point we decided to sharpen and expand our list. We expanded it by focusing upon behaviors that suggested the student was working with the material to make meaning (active response as opposed to a passive response). We sharpened it by returning to the question, "What evidence would we and teachers accept that this active reading has taken place or is taking place."

As a result of this process, we identified seven products of active reading behavior. They are: Identifying unknown words, paraphrasing, summarizing, predicting, asking questions, making diagrams, and varying reading rates.

## EVIDENCE OF THE ACTIVE READING BEHAVIOR

Below we present an explanation of each of the seven active reading behaviors. Within each explanation we define the behavior, suggest what we believe mature, active readers do as they engage in such behavior, and identify the evidence the teacher can accept that active reading is taking place.

### Identifying Unknown Words

Unknown words refer to: (1) outright unknowns (that is, words whose configurations and meanings are not known); (2) words the student has seen in context but to which he or she does not attach meaning; (3) words that the student can use orally but does not attach meaning; (4) words that the student can use orally but does not recognize in print; and (5) misconceived words (those to which the student attaches a wrong meaning, given the context).

Every word in a passage makes some contribution to the meaning of that passage. A reader who is actively reconstructing meaning makes adjustments when confronted with an unfamiliar word or one that does not make sense in the context of the selection. The teacher can make the reader more aware of the importance of stopping to examine these words and can provide practice in doing so. But, ultimately the reader must take the responsibility for recognizing the unfamiliar word or the familiar word that does not fit the context in which it is being used.

In a sense, the identification of unknown words is probably the single most important step in improving reading skills. If a key word remains a mystery to students or if their interpretation of an unknown word is muddled, chances are they will not understand the passage or will misperceive the author's message. The example comes to mind of a politician some years ago who campaigned in a largely illiterate section of our country. He charged his opponent with "practicing monogamy." Those constituents who were stumped by the word monogamy probably thought it was a euphemism for something vice. (The opponent lost the election!) Clearly, all teachers must stress the identification of unknown words so that students may be freed from the tyranny of misconception.

### Paraphrasing

We use paraphrase to mean restating a word, phrase, sentence, or portion of a paragraph in one's own words. Paraphrasing is not editing or interpreting or summarizing. When students paraphrase, they should not excise, delete, expand, or emphasize parts of the original text. Rather, they

simply restate the original in their own words. They are in effect translating meaning into their own vocabulary and thus their own frame of reference.

The teacher will recognize, however, that paraphrases by their very nature are limited; no written passage of great length can be expeditiously paraphrased, and no lengthy oral passage can be remembered in sufficient detail to permit accurate paraphrase.

The student's ability to paraphrase also signals to the teacher that the student has a literal knowledge of the material and what cognitive structures the student is using as the original text is cast into familiar words and a personal frame of reference. At times this active processing, thinking and playing with the text takes place in the middle of reading a passage—as the reader rereads a phrase or a sentence. At times it happens after reading as the reader reviews what was read. The ability to paraphrase is important because it allows the student to practice a basic communication skill.

### Summarizing

Summary is both more and less elastic than paraphrase. A summary, unlike a paraphrase, freely employs the same words and sentences as its source, but varies greatly from the source in amount of detail and length. A summary is more creative than a paraphrase in that it selects essential material, deletes peripheral material, and may rearrange and prioritize material in a manner different from its source.

Summaries may take different forms depending upon their purpose. A summary may be an outline or synopsis, in the same way that a sketch gives the basic outlines of a portrait. One summary might reflect the reader's expectations and the ways in which these expectations are met; another summary might reflect an author's stated goals and the degree to which these are met. The internal organization of a piece of writing might form the basis of one summary; the ramification or extensions of an article or chapter might determine the nature of another kind of summary. Each summary, no matter which form, is evidence that the reader is acting upon or interacting with the meaning inherent in the text.

Summaries can help both student and teacher in a number of ways. Since summaries focus attention on key concepts, they can help a student organize thoughts, promote retention of significant details, provide automatic review of material, and increase motivation—since the "nugget of knowledge" expressed in the summary is a tangible by-product of the studying/summarizing process. Summaries also help students reduce a complex, elaborate text to the level of mnemonic manageability. For teachers, student summaries can be used as clear indices of reading comprehension, as diagnostic devices that give clues to students' reading difficulties, and as preparatory assignments before examinations.

### Predicting

To predict means simply to suggest outcomes on the basis of limited information. This information may come either from the student's own experience, a preview of the reading passage, or having read a portion of the text. Obviously, depending upon the amount of information known the prediction will be either more or less apparent, more or less of a "wild guess." Predictions can be appropriate or inappropriate. We believe active readers regularly create reasonably accurate and appropriate projections. Such anticipation results in readers who are reading purposively and reading to verify what they believe to be true.

The challenge of predicting outcomes can lend an element of curiosity and intrigue to the reading matter. Students who are interested enough to make a prediction about what will

come later in the text have a personal stake in the material. They are motivated. Predictions also promote intelligent guessing and intuitive thinking. If students can make accurate and appropriate predictions based on an introductory reading passage, the teacher is assured they have probably understood the material. Students who predict at appropriate spots within a passage, display an understanding of the logic or flow of the material.

### Asking Questions

Usually we think of questioning in relation to tests, classroom discussions, and exams. In this context, questions are designed to elicit various kinds of information from the student. At their most complex levels, such questions may encourage students to reorganize and interrelate the discrete items of information they have learned. In terms of active reading behavior, questions are formed by the student and guide the student toward learning facts or concepts on various levels of difficulty. In this context the asking of questions by the student is a focusing or guiding activity, not a testing or checking activity.

When students read with some questions already in mind, they are less likely to be distracted and are more likely to focus productively on important aspects of the text. Students who read to answer questions they have formulated for themselves are actively engaged in the reading process. They are conscious of their own purpose of reading and read more critically. When question-asking becomes an automatic and incorporated part of the student's reading behavior, that student reads more effectively and efficiently.

### Making Diagrams

Diagrams are defined here as any device by which the student can translate reading material or speaking into a visual pattern. Diagrams, then, may include sketches, drawings, charts, illustrations, outlines, floor plans, maps, timelines, and so on. Students frequently diagram three types of information: (1) chronological (time order); (2) spatial (shows differences from area to area); and (3) expository (organizes information to show relationships between ideas of facts, such as cause and effect, classification, hierarchy, etc.)

### Varying Reading Rate

Active readers change their reading rates to suit the material or the purpose for reading. By watching eye movement, evidence of increasing rate can be observed as the reader skims (getting the most out of a passage), scans (reading to locate specific facts or ideas), and even skips sections of a passage. Behaviors that suggest the reader is slowing down include rereading, reading and reflecting (stopping at the end of a sentence, paragraph, or section to think over what has just been read), notetaking, and underlining.

## UNANSWERED QUESTIONS

*Have we identified appropriate active reading behaviors? Have we selected the right products for active reading behaviors?*

Originally we generated a list of 20 active reading behaviors. The initial list of behaviors was generated on the basis of what, we felt, good readers do when they read. In other words, we considered what students, colleagues, and other good readers do when they read. Almost as soon as we developed the list we began to reconsider the behaviors and

started to reduce the number of behaviors on the list.

The reduction process was based in part on redundancy of items and in part on further analysis of what good readers do. You might ask what role, if any, did research play in making our decision to pare down the list. The answer is very little. We were looking for an approach that could have immediate utility for the secondary teacher. Could we have overlooked some important behaviors and could we have identified some products of these behaviors that are inappropriate? The answer to both these questions is yes.

We believe that both reading experts and teachers in the field need to help us in identifying other behaviors that should be included on the list. Also, there is a need for other suitable products of these behaviors to be identified. We are not sure if we have identified the essential products of these behaviors, or if we have missed many obvious products that should have been included.

The answer to these first two questions depends on further probing, questioning, and listening carefully to others involved with teaching reading or teacher training.

*Are the active reading behaviors we identified appropriate for one content area but only partially appropriate for other content areas?*

The answer to question one will go a long way toward answering this question. If the list of seven active reading behaviors is expanded or modified, then the list will also need to be reexamined in light of the demands of various subject area reading tasks. These demands will probably be closely related to the various types of reading materials that are used in teaching the subjects we find in today's secondary schools.

*What questions might teachers, administrators, and parents ask?*

There is a host of other related questions that also need to be considered. These questions are:

- Do teachers find this approach useful?
- Do students who exhibit these active reading behaviors correlate with successful readers?
- Are active reading behaviors coachable through the use of glossing?
- Can students be taught these active reading behaviors and if so, does the acquisition of these behaviors improve reading scores?

These four questions along with other practical questions about the utility of the active reading behavior approach could be asked. We feel the key is whether answers to these last four questions should be obtained before even dwelling on questions one and two. Stated another way, these last four questions are the more practical ones and might make it easier to answer the first two which are the more theoretical questions. Finally, the question of how the notion of active reading behavior fits into other theoretical models and processes of reading needs to be examined at some future date.

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## A SUMMARY OF STUDIES ASSESSING SECONDARY TEACHERS' ATTITUDES AND PERCEPTIONS OF COMPETENCY IN CONTENT AREA READING INSTRUCTION

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Developing students' reading proficiency in the various content areas is a growing concern among educators. Administrators and teachers are becoming increasingly aware that many students are not able to meet the reading expectations in the secondary school curriculum. Until recently, many educators had considered reading instruction to be solely the responsibility of the elementary schools. Secondary teachers and administrators operated on the assumption that once students were taught the basic reading skills in these first years of school, the development, application, and refinement of these skills would follow naturally with simple usage. These secondary teachers and administrators believed that the general reading skills taught in the elementary school would be adequate for the successful reading and achievement in the various secondary content areas.

This assumption is slowly being discarded. Today, confronted with the growing number of secondary students who are unable to meet the reading requirements in the content classrooms, more educators are realizing that not only improved reading instruction at the elementary level but also continued developmental reading instruction at the secondary level is imperative. These educators have observed that as students progress through the grades, increased proficiency in reading skills is needed in order for students to keep pace with the growing demands of the content area curriculum. Without a parallel development of reading skills, achievement in the subject areas is severely hampered.

In discussing the importance of reading in the subject matter areas, Taschow (1969) emphasized that reading is so integrated and so interrelated with any subject area and therefore with the total educational progress that educational success requires successful reading. Realizing that "both content and concomitant reading skills are essential components of successful subject-matter teaching and learning" (Burron & Claybaugh, 1974, p. 7), most authorities in education are beginning to insist that reading instruction is the responsibility and the job of all teachers in the secondary schools.

Although efforts have been made to establish developmental reading programs at the secondary level, many surveys investigating the state of content area reading instruction have cited a reluctance on the part of secondary teachers to recognize and to accept their responsibility for the teaching of reading skills relevant to their content areas (Bowren, 1970; Fallon & Filgo, 1970; Farr, Laffey, & Brown, 1970; Hill, 1971). Authorities in secondary reading instruction have suggested two major factors for content teachers' hesitation to accept their responsibility in teaching reading skills.

The first factor was that secondary teachers did not have the attitudes conducive to teaching reading skills in the content areas. Many content area teachers did not perceive reading instruction to be an important aspect of successful content instruction. They frequently stated that developing students' reading ability was the job of the reading teacher or the English department (Hill, 1971; Marksheffel, 1969; Umans, 1963).

A second factor was that content teachers did not have the competencies necessary for the successful teaching of reading in their subject areas. The training and experience of secondary teachers had not equipped them with the skills required for integrating reading instruction with content instruction. Even when content teachers expressed a desire to help students develop better reading skills, these teachers often stated that they did not feel competent or confident in their ability to provide this instruction (Bader, 1973; Burnett, 1966; Marksheffel, 1969; Muskopf & Robinson, 1966).

The authors of this paper suggested an alternative factor influencing secondary teachers' reluctance to assume responsibility for teaching reading skills. The assessment instruments used in most of the surveys investigating secondary teachers' attitudes and competencies in reading did not clearly define the term "teaching reading in the content area." The two most frequently used instruments, the free-responses on open-ended questionnaires and the broad, philosophical statements on Likert scales, failed to provide secondary teachers with examples of the integration of reading instruction with content instruction. Chin and Hesse believed that the lack of specific illustrations or a clear definition of content area reading instruction may have influenced teachers to respond inaccurately or negatively on such assessment instruments.

As a result of this observation these researchers postulated that if secondary teachers were provided with an operational definition of content area reading instruction using specific competencies to illustrate methods of teaching reading in the content classroom, then teachers would be able to report more precise and perhaps more positive data on their attitudes and competencies in teaching reading.

To test this idea, a thorough review of the professional literature on content area reading instruction was conducted to ascertain the areas in which experts believed secondary teachers should be competent. The reading experts recommended teacher competency in the following areas:

- developing students' vocabulary, study skills, and critical reading skills
- assisting students in setting reading purpose, in interpreting graphic and pictorial aids, and in adjusting reading rate
- diagnosing students' reading strengths and weaknesses
- individualizing reading objectives
- selecting instructional reading materials
- designing reading-study guides and questioning strategies
- grouping for reading instruction
- motivating students to read extensively in the content area

For each of these areas, specific competency statements were created to exemplify the integration of reading instruction with content instruction. These competency statements were submitted to a panel of secondary content teachers and reading experts who evaluated each statement on the basis of two criteria questions: 1) Does this statement illustrate a teacher competency in content area reading instruction, that is, does it require a knowledge of reading instruction and its application in the content area? and, 2)

Does this statement apply to all content teachers who use reading materials in their classes?

As a result of this process, 27 competency statements representing content area reading instruction were derived. Each statement was judged to be an important competency in content area reading instruction, applicable to teachers in all content areas. In addition, the 27 statements, as a whole, represented the areas of competency recommended in the professional literature in content area reading instruction.

To assess separately teachers' attitudes and perceptions of competency in content area reading instruction, the 27 skill statements were randomly ordered on two independent, summated rating scales, the Chin Inventory on Content Area Reading Instruction.

The first scale, Part A of the Chin Inventory, measured attitude toward content area reading instruction. A teacher indicated the degree and direction of his/her attitude toward content area reading instruction by rating the importance of each of the statements on a five-point scale. To increase personal commitment to the response, each statement on this scale began with "To me, . . ." For example,

To me, incorporating into my assignments instruction on how to read regular classroom material is  
 VERY IMPORTANT 1 2 3 4 5 NOT IMPORTANT

The number selected on the attitude scale became the weighted response assigned to that item. The sum of the 27 weighted responses was that teacher's attitude score, with a low total score indicating a more positive attitude toward content area reading instruction than a high total score. A total attitude score could range from 27 (1 X 27) to 135 (5 X 27), with any score below 81 (3 X 27) reflecting an attitude on the positive side of the scale.

The second scale, Part B of the Chin Inventory, measured perception of competency in content area reading instruction. A teacher indicated the degree and direction of his/her competency in content area reading instruction by rating his/her qualification to perform each of the skills on a five-point scale. To increase personal relevance to each item, this part of the instrument was prefaced with the question, "How qualified are you. . . ?" For example,

How qualified are you to assist students in setting a definite purpose for reading assigned materials?  
 VERY QUALIFIED 1 2 3 4 5 NOT QUALIFIED

The number selected on the competency scale was the weighted response assigned to that item. The sum of the 27 weighted responses was that teacher's perception of competency score, with a low total score indicating a more positive perception of competency in content area reading instruction than a high total score. A total score in perception of competency could range from 27 (1 X 27) to 135 (5 X 27), with any score below 81 (3 X 27) reflecting a perception of competency on the positive side of the scale.

The content validity of the Chin Inventory, as discussed previously, was established through two criteria: 1) the individual statements illustrated specific competencies in content area reading instruction, and 2) the total set of statements presented an operationally defined, competency-based view of content area reading instruction.

The reliability of this assessment instrument was determined by the split-half method. Reliability coefficients of .92 for the attitude measure and .97 for the perception of competency measure were determined using the Spearman-Brown prophecy formula on a sample population (N = 224). The coefficients obtained for each of the subgroups in the sample population ranged from .86 to .98, all of which were highly reliable for group measurement purposes.

The Chin Inventory on Content Area Reading Instruction has been used in three studies conducted in different geographical regions and covering a period of six years. Each of the studies was designed to investigate the factors influencing secondary teachers' attitudes and perceptions of competency in content area reading instruction. Each of the studies are available in the literature and are summarized in Figure 1.

FIGURE 1

SUMMARY OF FOUR STUDIES USING THE CHIN INVENTORY ON CONTENT AREA READING INSTRUCTION

FACTOR:	MEASURE:	
	ATTITUDE	PERCEPTION OF COMPETENCY
Content Area Responsibility	CF, E, K*	CF, e, K
Training in the Teaching of Reading	cf, e, K	CF, E, K
Amount of Teaching Experience	cf, k, c	CF, k, C
Instructional Teaching Level	cf	cf
Certification Program Level	c	C

\*Letters indicate the studies that investigated each factor. The letters should be interpreted as abbreviations for the studies:

CF for Chin-Flanagan (1975)  
 E for Evans (1977)  
 K for Kozey (1980)  
 C for Chin's most recent study.

Capital letters are used if the study found significance at the .05 level. Lower case letters are used if the study found no significance at the .05 level. If the factor was not investigated by the study, that study's letter is not used.

Chin designed a study to answer the following research questions: 1) Is there a significant difference in the attitudes and perceptions of competency in content area reading instruction between preservice secondary teachers and inservice secondary teachers? 2) Is there a significant difference in the attitudes and perceptions of competency in content area reading instruction between inservice secondary teachers with different amounts of teaching experience? 3) Does training in the teaching of reading significantly change the attitudes and perceptions of competency in content area reading instruction of preservice secondary teachers and inservice secondary teachers? 4) Does training in the teaching of reading significantly change the attitudes and perceptions of competency in content area reading instruction of inservice secondary teachers with different amounts of teaching experience?

Data was gathered on Florida preservice and inservice secondary teachers during a two-year period of time. These preservice and inservice secondary teachers ( $N = 210$ ) were enrolled in content area reading courses at the University of Central Florida. There were eight content area reading courses taught by Chin from January, 1979, through December, 1980. Preservice and inservice secondary teachers, whether enrolled in separate undergraduate and graduate classes or in combined undergraduate and graduate classes, received the same reading course instruction. On the first day and the last day of each term's reading course, the teachers were asked to complete the Chin Inventory on Content Area Reading Instruction. Participation in the study was voluntary and anonymous and did not influence in any manner the course grades.

Eight research hypotheses were tested at the .05 level of significance using independent, one-way analyses of variance. The results are presented in Tables 1 through 8. Tables 1 through 4 report the analysis of data obtained on teachers' attitudes and perceptions of competency in content area reading instruction before course instruction in teaching reading. Tables 5 through 8 report the analysis of data obtained on teachers' attitudes and perceptions of competency in content area reading instruction after course instruction in teaching reading.

Chin found that preservice secondary teachers' attitudes ( $X = 50.44$ ) toward content area reading instruction did not differ significantly ( $F = 0.46$ , d.f. 208, 1,  $p > .05$ ) from inservice secondary teachers' attitudes toward content area reading instruction ( $X = 51.82$ ). Both preservice secondary teachers and inservice secondary teachers reported comparably positive attitudes toward teaching reading in the content areas. However, preservice teachers did differ significantly ( $F = 30.86$ , d.f. 208, 1,  $p < .01$ ) from inservice teachers in their perceptions of competency in content area reading instruction. Inservice secondary teachers had significantly more positive perceptions ( $X = 81.28$ ) of competency than preservice secondary teachers ( $X = 64.64$ ). It seems appropriate that preservice teachers, having had no regular classroom teaching experience, would feel less qualified to teach content area reading than experienced inservice teachers. It is interesting to note, though, that both the inexperienced preservice teachers and the experienced inservice teachers recognized and valued equally the importance of content area reading instruction.

To analyze the influence of amount of teaching experience on secondary teachers' attitudes and perceptions of competency in content area reading instruction, the inservice teachers were grouped according to different amount of teaching experience 1-4 yrs,  $X = 52.08$ ; 5-8 yrs,  $X = 53.16$ ; 9-12 yrs,  $X = 46.10$ ; and 13-16 yrs,  $X = 49.83$ . Amount of teaching experience was not a factor influencing inservice secondary teachers' attitudes toward content area reading instruction ( $F = 0.56$ , d.f. 104, 3,  $p > .05$ ). However, there was a significant difference ( $F = 3.49$ , d.f. 104, 3,  $p < .01$ ) in inservice secondary teachers' perceptions of competency based on different amounts of teaching experience, but there was no relationship between increased teaching experience and more positive perceptions of competence in content area reading instruction: 1-4 yrs,  $X = 69.42$ ; 5-8 yrs,  $X = 64.35$ ; 9-12 yrs,  $X = 50.70$ ; and 13-16 yrs,  $X = 50.16$ .

To determine the influence of training in the teaching of reading on secondary teachers' attitudes and perceptions of competency, gain scores for the attitude measure and the perception of competency measure were computed by subtracting the after-course instruction scores ( $X_2$ ) from the before-course instruction scores ( $X_1$ ). Independent, one-way

analyses of variance were then performed on these attitude gain scores and these perception of competency gain scores.

No significant difference was found between preservice secondary teachers' attitude gain scores ( $X_1 - X_2 = 7.15$ ) and inservice secondary teachers' attitude gain scores ( $X_1 - X_2 = 9.64$ ). The analysis of data ( $F = 2.53$ , d.f. 208, 1,  $p < .05$ ) shows that both preservice teachers and inservice teachers increased their positive attitudes toward content area reading instruction as a result of training in the teaching of reading. Thus, while reading instruction assisted secondary teachers in valuing the importance of content area reading instruction, the reading instruction did not differentially affect preservice teachers and inservice teachers.

Chin did find a significant difference ( $F = 13.25$ , d.f. 208, 1,  $p < .01$ ) in the perception of competency gain scores of preservice teachers ( $X_1 - X_2 = 25.37$ ) and inservice teachers ( $X_1 - X_2 = 17.24$ ). While both preservice teachers and inservice teachers increase their perceptions of competency through reading instruction, the preservice teachers reported a significantly greater increase in their competency than the inservice teachers. The data reveal that both before course instruction and after course instruction, inservice secondary teachers felt more qualified to teach reading than preservice secondary teachers. When the after-instruction competency scores of preservice teachers were compared to the before-instruction competency scores of inservice teachers, it appeared that preservice teachers with training in teaching reading felt more qualified to teach reading than inservice teachers without training in teaching reading.

Different amounts of teaching experience ( $F = 2.57$ , d.f. 104, 3,  $p > .05$ ) was not a factor influencing the attitude gain scores ( $X_1 - X_2$ ; 1-4 yrs,  $X = 5.87$ ; 5-8 yrs,  $X = 13.61$ ; 9-12 yrs,  $X = 12.20$ ; and 13-16 yrs,  $X = 8.33$ ) of inservice secondary teachers. The perception of competency gain scores of inservice secondary teachers were also nonsignificant ( $F = 1.63$ , d.f. 104, 3,  $p > .05$ ) with  $X_1 - X_2$  scores as follows: 1-4 yrs,  $X = 19.39$ ; 5-8 yrs,  $X = 17.00$ ; 9-12 yrs,  $X = 14.55$ ; and 13-16 yrs,  $X = 5.83$ . Inservice teachers, regardless of years of teaching experience, gained comparably and positively in their attitudes and perceptions of competency through training in the teaching of reading.

The three studies cited for reader review and the new study presented in this paper investigated the factors influencing secondary teachers' attitudes and competencies in content area reading instruction, using the Chin Inventory on Content Area Reading Instruction. Data on secondary teachers' attitudes and perceptions of competency were obtained over a period of six years in four different regions. Statewide surveys of secondary teachers in Oregon (Chin-Flanagan, 1975) and in Mississippi (Evans, 1977) were conducted. Canadian secondary teachers in one urban area, Regina, Saskatchewan, were surveyed in the Kozey (1980) study. Most recently, preservice and inservice secondary teachers in a state university in Florida were surveyed in the Chin study. These four studies provide much information on the state of content area reading instruction as perceived and reported by secondary teachers. The findings of these four studies are summarized in Figure 1.

Content area responsibility was a major factor influencing secondary teachers' perceptions of content area reading instruction. A significant finding of these studies was that even though secondary teachers reported positive attitudes and positive perceptions of competency in teaching reading, these attitudes and perceptions of competency differed according to content area responsibility. Content area responsibility influenced teachers' attitudes in three studies and influenced teachers' perceptions of competency in two of the three



studies. In addition, Chin-Flanagan and Kozey found a similar ordering of content areas in attitudes and perceptions of competency. Ranked from most positive to least positive attitudes and perceptions of competency were language arts teachers; social studies teachers, science teachers, and mathematics teachers, respectively. Evans found language arts teachers more positive in their attitudes toward content area reading instruction than the social studies teachers and science teachers.

Training in the teaching of reading was a significant factor influencing secondary teachers' attitudes and perceptions of competency in content area reading instruction. Three studies found that secondary teachers who had received instruction in the teaching of reading felt more qualified to teach content area reading skills than secondary teachers who had not received instruction. Of the three studies, only one study found training in the teaching of reading to be a factor influencing secondary teachers' attitudes toward content area reading instruction.

Amount of teaching experience was a factor influencing secondary teachers' perceptions of competency in content area reading instruction in two of the three studies. In neither of these two studies, though, was increased years of teaching experience related to increased perceptions of competency. Amount of teaching experience did not influence secondary teachers' perceptions of the importance of content area reading instruction.

Instructional teaching level did not influence secondary teachers' attitudes or perceptions of competency in content area reading instruction. Both junior high/middle school teachers and senior high school teachers reported comparably positive attitudes and positive perceptions of competency.

The certification program level of secondary teachers did not influence their attitudes in content area reading instruction. Both preservice secondary teachers and inservice secondary teachers had similar positive attitudes toward content area reading instruction. Certification program level was a factor influencing secondary teachers' perceptions of competency. Inservice teachers felt more qualified to teach reading in the content area than preservice teachers. When these teachers' attitudes and perceptions of competency were compared before and after instruction, Chin discovered that certification program level influenced teachers' perceptions of competency but not their attitudes toward content area reading instruction. Preservice secondary teachers experienced a greater increase in their perceptions of competency after course instruction than inservice secondary teachers.

Secondary teachers' positive attitudes and positive perceptions of competency in teaching reading were significant findings in these four studies. Contrary to earlier studies that reported content teachers' reluctance to focus on necessary reading skills and content teachers' lack of confidence in teaching reading skills, these four studies discovered that secondary teachers (1) do value the importance of teaching reading in the content areas, (2) do feel qualified to teach reading skills in the content areas, and (3) do feel that they teach reading skills in their content classes.

The authors of this paper believe that these positive reports from secondary teachers can be attributed to the precise nature of the assessment instrument, the Chin Inventory of Content Area Reading Instruction. Since the Chin Inventory provided concrete illustrations of the integration of reading and content instruction, secondary teachers were able to perceive the importance of content area reading instruction. In addition, as secondary teachers recognized the value of reading instruction as a method of good content instruction,

their confidence in their ability to teach reading increased. Thus, these four studies found positive attitudes and positive perceptions of competency because the Chin Inventory enabled teachers to respond to competency statements which clearly described reading instruction in the context of content instruction. This competency-based instrument assisted teachers in identifying and accepting their role in content area reading instruction.

The next step in research in content area reading instruction needs to occur in the classroom. Now that there is evidence that secondary teachers do value and feel qualified to teach reading skills in their content areas, answers to the following questions must be investigated: (1) What do secondary teachers do with their students when they teach reading skills in the content areas? (2) What evidence or behaviors indicate that reading comprehension of the content material has occurred? (3) What active reading behaviors do content teachers look for, recognize, and encourage in their students? (4) Are these active reading behaviors content-specific or are they inherent in all content area reading? (5) How do content teachers teach active reading and how effective are these methods in increasing students' reading skills in the content areas?

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## PUPIL READING PURSUITS IN CONTENT AREA CLASSROOMS: DATA NEEDED BY POLICY MAKERS

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At the present, there is no American tradition of educational research relevant to policy concerns, . . .

Basic research has served technological functions, but has ignored school policy. Often 'basic research' seems to mean research from which no policy inference can be drawn.

Actually, different kinds of research do yield various policy implications, but if meaningful benefits are to be gained, policy concerns must enter the thinking of the research worker when the research problem is formulated.

Harnischfeger and Wiley, 1976

**Fact:** Twenty-eight states mandate that pre-service instruction for all secondary teachers shall include attention to reading in the content area. (Thomas and Simpson, 1979) In Oregon, this means each prospective secondary teacher must take a three credit course entitled Reading and Writing in the Secondary School. In Oregon, this one course usually represents 16% of the total amount of the formal professional education course work required of pre-service teachers.

**Fact:** As of 1979, all but four states have lists of educational standards that high school students should meet. Twenty states have competency tests for graduation. In Oregon the State Board of Education Standards for School (1976) states, "Each local district shall adopt and implement a system of instructional program planning and assessment to provide for: Assessment in reading within three instructional programs (content areas) by September 1, 1979 and six by September 1, 1981."

**Fact:** Studies by Flanagan (1975), Kozey (1980), Chin and Hesse (1980) found teachers of social studies, language arts, math and science report content area reading instruction is more important than not important and rate themselves as being more qualified than not qualified to provide content area reading instruction.

**Fact:** The literature on the teaching of reading in the content areas reveals little if any information on actual teacher activities and pupil reading pursuits in secondary subject area classrooms.

This paper calls for researchers to begin to gather base line data answering questions "what quality content area reading instruction takes place" and "what is quantity and duration of student content area reading pursuits." Included in this paper will be framework upon which to build such research, a description of desired secondary content area pupils' reading pursuits, and an observational methodology.

It is our belief that data called for here is pertinent to opinion setters who are calling for content area reading instruction, to policy makers who mandate allocation of time and staff in preservice education and in subject area classrooms, and to educators who design secondary school reading programs.

At the present time, reading educators and school administrators lack a clear set of expected/desired student behaviors in content area reading. In addition, we have no way of assessing the teaching of these reading behaviors. Hopefully the framework we describe will be a step toward gathering data that will be helpful in reviewing and setting defensible policy on secondary content area reading instruction.

## A Framework for Policy Influencing Research

Harnischfeger and Wiley (1976) developed a comprehensive model for classroom teaching-learning process. Their model emerged as they searched for evidence of teacher effectiveness or the relation of educational practice to outcomes. Even though their model was created with the self-contained elementary classroom in mind, we feel it is an appropriate framework for research in the secondary school.

Central to their model of the teaching-learning process is the pupil's activity. They feel it mediates the effects of district curriculum, school organizations, and teacher's activities.

The outline of their model has six components which fall into three categories: background, teaching-learning process, and acquisition. The second category, teaching learning process, includes teacher activities and pupil pursuits. While they claimed most research tends to be on teacher behavior, we contend current research related to content area reading focuses upon the background components labeled as curriculum institutional factors and teacher background. Frequently this last component includes research related to teacher's attitude toward and perceived competence in the teaching reading in content area. We concur with Harnischfeger and Wiley when they identify pupil pursuits as being central to the teaching-learning process, and we have thus developed an observation guide that will be useful in gathering base line data with regard to pupil reading pursuits in the content area classroom.

Our gross definition of pupil pursuits parallels Harnischfeger and Wiley's. It includes pupil activities and the joint action of the teacher and pupil. Pursuits refer to what teachers and student do in the process of learning, including what appears to be active, passive or oblique activities.

Our framework for measuring the kind, quantity, and duration of student reading pursuits and other activities in a content area classroom was initially developed by systematically observing and recording all classroom activities that occurred. Once recorded, those activities were placed into categories—those which were reading related and those which were not. Since our focus was upon student reading pursuits, most of our further sub-categorization dealt with reading.

The non-reading activities were only sub-divided into two categories, teaching-learning content and non-instruction. For example, having students write a report after seeing a film on cell reproduction is an example of a "teaching-learning content" activity and organizing the class into groups for car pooling on a field trip would be a "non-instructional" activity.

The reading pursuits were sub-grouped as active reading pursuits, passive reading pursuits, and oblique reading pursuits. Each of these in turn were clarified as additional sub-sets of pursuits were identified. A visual display of the categorization of student pursuits in a content area classroom is presented in Figure 1.

**FIGURE 1**

### Student Pursuits In A Content Area Classroom

- I. Non Reading Related Pursuits
  - A. Teaching-learning content
  - B. Non instructional
- II. Reading Related Pursuits
  - A. Active Reading Pursuits
    1. Pre Teach Reading Vocabulary
    2. Pre Teach Reading or Study Skills
    3. Providing Background Information for Reading

4. Student Reads with Direct Teacher Instruction
5. Student Practices Skills or Shows Evidence of Active Reading Behaviors Taught
- B. Passive Reading Pursuits
  1. Student Reads Silently Using Non Teacher Prepared Material
- C. Oblique Reading Pursuits
  1. Student Reads Orally
  2. Teacher Reads Orally
  3. Skills Taught In Isolation
  4. Review, Assessment of Reading.

### Defining Reading Related Pursuits

In order to train observers who could record the kind, quantity, and duration of the pupil pursuits in the content area classrooms, each category of Reading Related Pursuits was defined. Each definition typically included what was meant by the terms used as well as a discussion of why the pursuit was chosen. Examples as well as non examples of the teacher and student behavior or interaction related to each pursuit were also included. These definitions are presented below.

#### A. Active Reading Pursuits

These are activities which take place in preparation for, or during reading. The reading is done in content-related material and direct instruction is given by the teacher.

**Pre-teach Reading Vocabulary:** This category is used if, at some time before the students read, the teacher presents any of the words which the students will encounter in the reading assignment. The literature devotes much space to pre-teaching vocabulary, with most reading and subject matter educators contending that the concepts of content subjects, particularly at the secondary level, can be explained only by use of a specialized vocabulary. Nearly every educator reviewed list as one of the most important tasks of a content area teacher that of teaching students to read and understand the vocabulary necessary to give meaning to concepts which are being taught.

Students with meager vocabularies often fail to read selections with complete comprehension and often fail to appreciate some of the fine shades of meaning and precision embedded in certain words. Vocabulary development is without question an important factor in teaching students to value reading.

Smith, Otto, Hansen (1979)

**Pre-teach Reading or Study Skills:** This category is used if the teacher gives the students an instruction on *how to read* the assignment, as, for example, if the teacher demonstrated the use of diagrams, (time lines, maps, graphs, drawings, outlines, or other visualizations of the material to be read), if the students are shown how to skim to get the general idea, how to scan to find specific information from the lesson, how to use references, how to adjust speed to meet the purpose of the assignment, how to take notes or underline, how to write questions, or how to predict outcomes. To be placed in this category, these skills must be directly related to a content area reading assignment. Although most reading courses and many language arts courses teach reading and/or study skills, there is little evidence that skills transfer from general instruction to content area reading. The effect of teaching students to use study skills should be to make them become increasingly independent readers, and studies such as those by Serra (1953) and Johnson (1952) indicate that there is a need for specific instruction in these skills *within the content* in which they are to be used.

**Providing Background Information for Reading:** In this category is placed any pursuit designed to "set the stage" for comprehension of the reading assignment; it may help the

students relate the new information to old experiences, provide motivation for reading, or give them a "mental set" so they will remember what they read. A pursuit does not belong in this category unless there is evidence that the activity is designed by the teacher to help the students understand their reading assignment. A film, for example, may provide background experience for many future reading assignments, but unless the teacher demonstrates that *this film* is to help understand *this reading assignment*, the category is not used. A film will generally be placed under the category of teaching-learning conduct. Other pursuits which might provide background experiences include pre-reading discussions, debates, lectures, field trips, role playing, and orally presented questions about what is to be read. The importance of this category is also well supported by educators who see the need to build a framework within which readers can place information which is read, and which provides a retrieval plan in which . . .

. . . the rememberer organizes memory search in terms of categories of information marked as important in the schema . . . providing implicit cues or mental pathways to relevant text information.

Anderson, Pichert, Shirey (1979)

**Students Read with Direct Teacher Instruction:** In this category is placed any pursuit in which students have reading material before them and the teacher is giving the students direct instruction as they read. Students and teacher may be working together to find main ideas, make predictions, determine author's meaning, discussing meanings of words used in a special context, etc. The criteria for using this category are that the printed material must be before the students, and the teacher and students are reacting to the material.

**Students Practice Skills or Show Evidence of Active Reading Behavior Taught:** If the students are given time in class to practice skills which help them read a specific assignment, this category is used. For example, the teacher may show how to make questions of chapter headings and sub-headings, then direct the students to write these questions as they read. In other instances, students may be displaying evidence of active reading behaviors taught by the teachers. Such active reading behavior include indentifying unknown words, paraphrasing, summarizing, predicting, asking questions, making diagrams, and varying reading rate. (Hesse, Bullock and Chin, 1980) and (Bullock and Hesse, 1981). If the teacher is working with the students (or with one student) and helping them write the questions, this is counted as direct instruction; if not, it is *practice*. One of the major values of teaching reading in content classes is the opportunity for practice of skills and demonstrate the behavior which has been learned. This practice offers immediate reinforcement of a skill, allows the student to see the relevance of skill instruction, and gives the teacher an opportunity to monitor the students as they attempt to use it to extract meaning from the assignment.

#### B. Passive Reading Pursuits

Here the student reads without direct student-teacher interaction. The material may or may not be content-related.

**Student Reads Silently—Using Teacher-Prepared Study Materials:** Pursuits in this category are those in which students read silently without any direct teacher interaction. However, the teacher has prepared study materials in the form of questions, word lists, outlines, instructions, or diagrams. Since these materials are handed to the students to read without oral explanations or discussion, the implicit assumption made is that the students can read this material. Since this assumption may not always be valid, we consider

this activity less important than oral, direct instruction. However, since the teacher has made some attempt to guide the students' reading, we make a distinction between this activity and one in which no such materials are prepared. If these study materials are given to the students along with oral explanations or discussions, they would qualify as direct teaching, and would be recorded as such, while the reading itself would be recorded as *practice*. Commercially prepared materials, such as workbooks, worksheets, or packaged programs do not qualify as study materials.

**Student Reads Silently Using Non Teacher Prepared Materials:** We use this category when students read silently without any oral or written guidance from the teacher. Students may be using texts, library books, workbooks, reference books, directions for activities, or any printed material.

### C. Oblique Reading Pursuits:

Pursuits which are only indirectly related to content area reading, or whose relationship is obscure, are labeled oblique pursuits. These activities may have student-teacher interaction, but lack one or more of the other qualifications for content area reading instruction. For example, reading skills may be taught independent of any subject matter assignments; student or teacher may read orally without attention to reading behaviors, or the interaction may take place after the student has read the material.

**Student Reads Orally:** This category is used if the students are reading orally and the only help given is in supplying words. (If instruction is provided with word decoding, word or passage meaning, or understanding of concepts, etc., this will be coded as direct reading instruction.) The effect of oral reading on comprehension is little understood; although it is often practiced there is little evidence that it is a valuable reading pursuit, unless used as an adjunct to direct instruction.

**Teacher Reads Orally:** This category will be used whenever the teacher reads aloud to the class unless (1) it is obvious that the teacher is supplying background or motivation for the reading assignment, or (2) the teacher is demonstrating a reading skill.

**Skills Taught in Isolation:** In this category will be placed any activity in which a reading or study skill is taught, but without reference to a specific reading assignment. By making this distinction between skills taught in isolation and those which are required for comprehension of a specific selection, we are defining the difference between teaching "reading" and teaching "content reading." When a skill is taught in the situation where it is needed, there is no need for concern about the problem of transfer.

**Review, Assessment of Reading:** Activities which fall into this category are those which take place *after* a reading assignment has been completed or after the teacher *assumes* that it has been completed. Review is important to the learning of content, but does nothing to help the student read the assignment. Assessment can be a valuable tool for the teacher in planning future assignments, but offers no aid to the student while reading that assignment. Activities included under Review and Assessment include questions (oral or written), discussions, and reports. If, during the review or assessment, the students are directed to specific passages in the assignment which are then read and discussed, this portion of the review is considered direct teaching.

## Proposed Data Collection and Analysis Procedures

We have developed an observational scale that will allow researchers to capture the critical raw data needed to make statements about the kind, quantity, and duration of main and sub-categories of pupil pursuit in a content area classroom. Using the observation form, observers can record the time a pursuit began, the participants (teachers and number of students) involved in the pursuit, and a short hand description of the pursuit.

Following the observation in each class, we will total the number of pupils within each of the following categories: active reading pursuits, passive reading pursuits, oblique reading pursuits, content instruction, and non instructional activities. In addition to totalling the number of pursuits, we will also compute the average duration of each pursuit within each of the five categories as well as the total amount of time spent on pursuits within each category.

Finally, we will establish a ratio of time spent on each of the five categories and between the two major categories, reading and non reading.

At the present time, we are sampling social studies and English classrooms at two grade levels—eighth and tenth in order to field test the observational tool, to test its sensitivity, and to begin to get a feel for the power of the data.

Assuming the field test is positive, we suggest appropriate opinion setters and policy makers collaborate in a carefully designed study that would provide them with data needed to make informed data based decisions.

### Next Steps and Unanswered Questions

The obvious next step is for these writers to have this proposed data gathering adventure critiques and field tested. The critique should include answers to these questions:

- 1) Will the data suggested be useful to policy makers—state and local boards and administrators who mandate time and resources be allocated to given educational events?
- 2) Will the data suggested be useful in a research design that tests the efficacy of content area reading instruction?
- 3) Is a focus on pupil pursuits as opposed to other components of the teaching learning process appropriate for secondary content classrooms?
- 4) How will teacher reports of time spent in reading pursuits compare with observational data?
- 5) What is the nature of out of class student reading pursuits?

Certainly this critique then must be followed by or done concurrently with an expanded field test that will enable reading researchers to make informal judgments about utility of the data to be collected. Ideally we see three or four simultaneous field tests taking place. Those involved in the field test would then collaborate with others in the critique and in designing a large study that will provide policy makers with a baseline and a model for the future.

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It would be tempting to conclude from Stanovich's discussion that poor readers should be taught to identify words faster. Some research has already been done which shows that the answer is not that simple. Fleisher, Jenkins, and Pany (1979) report the results of two interrelated studies which were designed to examine the effects of increasing decoding speed on the comprehension of poor readers. Poor readers were trained to read word lists and phrases before reading the passage that contained the words. Scores on subsequent comprehension measures were compared with good readers and untrained poor readers. Fleisher et al. found that decoding training on word lists or phrases did not result in improved comprehension. These findings support the earlier results reported by Samuels, Dahl, and Archwatemey (1974) that students who received speeded isolated word training performed no better on comprehension tests than untrained readers.

Fleischer, Jenkins, and Pany suggested that long-term repeated reading practice of words in context may be a "viable instructional strategy for improving comprehension" (p. 47). They point out that it is not known what aspects of the repeated reading practice are responsible for improving comprehension. They indicate that possibly the procedure could help students to chunk information or to become familiar with the vocabulary and the syntactic structure. Repeated reading may simply reduce the attentional burden of slow decoding. There is another factor that could contribute to the reported improvement in comprehension that results from repeated reading practice. Possibly repeated reading helps readers to associate the prosodic or intonation cues to meaning which are present in spoken language with the printed text where such cues are missing.

## WHAT RESEARCH ON PROSODIC CUES MIGHT HAVE TO SAY ABOUT COMPREHENSION AND AUTOMATICITY THEORY

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### Research on Rate of Decoding

In a recent article, Stanovich (1980) develops the argument that poor readers who are deficient in word analysis skills may be employing higher level strategies such as using context or intraword redundancy to identify words. Stanovich describes this action as a type of compensatory processing where a deficit in any particular process will result in a greater reliance on other knowledge sources regardless of their level in the processing hierarchy. This idea of compensatory processing could possibly explain why some poor readers seem to be able to comprehend better than they can decode words. Often these students score in the average or better range on intelligence tests. They demonstrate a sound knowledge of the world around them. The theory of compensatory processing would seem to suggest that these children could assign meaning to print based on their recognition of some of the words and their own common sense about how people act and events happen. Perhaps these students also learn a great deal from listening to what their teacher says about a passage or story and have also learned to use many of the cues that are present in questions when they are responding to items on comprehension tests.

Good readers quickly and automatically identify words so that they have attentional capacity left over for comprehension. Poor readers must expend much attention and effort trying various strategies either to identify and comprehend specific words or failing that trying to get some meaning from the text based on their background experiences and the words they can identify. Either way, the task is laborious and can result in comprehension errors.

### Research on Prosodic Cues

Read, Schreiber, and Walia (1979) report a study which suggests that prosodic cues are important signals of the syntactic structure of spoken language. They observed that 6 and seven year olds were not able to correctly identify the subject noun phrases of a spoken sentence if that sentence had a misleading intonation pattern. Using a type of modeling process, first graders were trained to identify the subject noun phrase in a spoken sentence. After each subject had reached the criterion of correctly identifying 4 consecutive multiple word subject noun phrases, they were given 13 test sentences, 9 of which had misleading intonation patterns and the others having multiple-word subjects and normal prosody. Read, Schreiber, and Walia (1979) found that first graders were able to correctly identify noun phrases in only 30% of the sentences with the false contours. But they got 83% of the normal sentences correct. Adult subjects who were given the same task were misled by incorrect prosody only 18% of the time. In a later *post hoc* study, Read et al. found that those first graders who correctly identified the subject noun phrases most often, even when the prosody was misleading, were ranked as good readers by their teachers significantly more often than those students who were misled by the incorrect prosody.

Based on these findings, Read et al. developed the hypothesis that learning to read involves, in part, learning to parse or recognize the syntactic cues to meaning in printed text without the use of the prosodic cues which are present in spoken language.

It would seem logical to hypothesize that if children are not able to compensate for the lack of prosodic cues in written text, reading and comprehension difficulties might result. For example, if children rely heavily on duration as a cue to structure in comprehending speech, problems might arise.

because prosodic cues are not systematically preserved in written language. Periods, commas, and parenthetical modifiers do signal structural information, but other sentence internal structures such as the subject-predicate boundary and some embedded clauses are not signaled by punctuation.

The findings of Read, Schreiber, and Walia (1979) as well as their hypothesis that poor readers may have difficulty learning to compensate for the lack of prosody in written text would seem to provide some insight into what may be happening with poor readers who have poor decoding skills and some compensatory but essentially inadequate comprehension skills. First, these findings point out the strong link between written and spoken language. In order to learn to read, children must learn that certain sounds are associated with certain written symbols. Secondly the results indicate that in order to learn to read children not only need to learn letter-sound correspondences, they also might need to learn to associate the correct prosodic cues with the printed text.

This reminder of the link between spoken language and learning to read and the idea that children might need to learn sound-print correspondences not only on the level of letters, syllables, and words but also on the sentence level supports the method of repeated reading and possibly explains one way in which the method aids poor readers, i.e. it helps them associate sound with print at all levels from the individual letter to the entire sentence. This research on prosodic cues also helps to explain why instructing poor readers to increase their decoding speed for isolated words has little or no effect on their comprehension. If children indeed rely on prosody as a cue to syntactic structure and thus as a cue to meaning, then learning to recognize words quickly out of the context of meaningful sentences and their inherent prosody would do little to improve comprehension.

### Informal Study of the Repeated Reading Method

Part I of the following study was done to compare the repeated reading method with the method of instructing children to recognize lists of words rapidly. The purpose of Part II was to try an approach which might be useful in studying the effects of prosodic cues and their contribution to the repeated reading method.

#### Part I

Four fourth and fifth graders practiced all the words in a passage until they could recognize them correctly and rapidly (word list practice). Then they read the passage aloud and wrote answers to comprehension questions. These same four children read a second passage aloud twice (repeated reading practice) and also wrote answers to comprehension questions. The oral reading of each child on each passage was taped. After the oral reading performances and the comprehension tests were scored, each child's oral reading and comprehension scores on the Word List Practice were compared with his or her own performance on these measures following the Repeated Reading Practice.

**Subjects** Of the four students who participated in this study, three were fifth graders and one was a fourth grader. All four children consistently failed most of the word attack subtests and consistently passed most of the comprehension subtests of the *Macmillan r* (Smith & Wardhaugh, 1980) end of level achievement tests. The oral reading performance of all four children could be characterized as slow and halting as omissions and substitutions were frequent. Their oral performance did not reflect an awareness of unmarked prosodic cues.

**Materials** The passages used in this study consisted of the beginning portion of stories selected from a third-grade text that is part of the Macmillan r series. All selections were approximately 125 words long. The comprehension tests for both selections were based on questions included in the teacher's manual that corresponded to the student text. There were four inferential and five factual questions for each passage.

**Procedure** Each child worked individually with the investigator. Two of the children received the word list practice first and then the repeated reading practice. The others received the treatments in reverse order. In the Word List Practice the child practiced the words contained in the story until all the words were identified rapidly and correctly. Following this, they read the passage once outloud. If they were unable, even after the word list practice, to identify a word in the context of the passage, they were told what the word was. Finally, they took the comprehension test. The Repeated Reading Practice consisted of asking the child to read the selected passage twice. The comprehension test was administered after the second oral reading.

**Results** The oral reading errors made by each child in both the Word List Practice and in the second reading of the repeated reading practice were scored according to the method recommended by Silvaroli (1976). No attempt was made to qualitatively analyze these errors; they were simply counted. Inspection shows that the children's oral reading performance as measured by the number of errors and their comprehension were better when they had the repeated reading practice over word list practice. A non-parametric statistic, the Walsh test (Siegel, 1956) was used to analyze these data. This test which gives significance levels for  $n$ 's as small as four showed that the differences between the two practices for both oral reading errors and comprehension were non significant at  $p = .062$ . The finding that comprehension was better thought not statistically significant at the .05 level in the repeated reading practice is not surprising. As Fleischer, Jenkins, and Pany (1979) reported, word list practice did not have an effect on improving the comprehension of poor readers while Samuels (1979) indicated that the repeated reading method did result in improved comprehension. The finding that the children made fewer oral reading errors after they had practiced reading a passage once than when they had practiced the words out of context could be seen as tentative support for the notion presented by Read, Schreiber, and Walia (1979) that children need to practice the process of transferring their knowledge of oral syntax to the printed text.

#### Part II

The materials used in Part II were selected from the same text as those used in Part I and the comprehension questions were constructed in the same way. The repeated reading practice was also the same as it had been for Part I. But for the patterned practice, the children listened to the passage being read as they followed along in their own text. Then they read the passage aloud once and took the comprehension test. The oral reading errors from both practices and the comprehension tests were scored as in Part I. The children as a group scored slightly better in comprehension and made fewer errors in the patterned practice. According to the Walsh test these differences are significant at  $p = .062$ . This finding does seem to provide some tentative support for the notion that prosodic cues do have an influence on oral reading performance and on comprehension. At least correction intonation was a factor that was present when the children listened to the passage being read.

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## COMPREHENSION RESEARCH AND DIAGNOSIS: BEYOND SINGLE DEPENDENT MEASURES

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Often, we speak of someone as having problems with comprehension in general or define comprehension in terms of a score on a comprehension test. Usually, these tests are made up of many questions which tap various kinds of information and require a multitude of mental gymnastics to answer. At a recent conference, one theme which surfaced in virtually every paper was that comprehension is best defined in terms of a particular criterion task. One reason for this assertion is that a global definition of comprehension which is reliable has yet to find agreement among researchers and practitioners. In fact, such an endeavor is probably counterproductive since there are different types and levels of comprehension, any of which might be sufficient for certain criterion tasks. The position taken by the presenters is that no one measure adequately captures the nature of comprehension. The composite picture of comprehension generated by research strategies adopting a narrow definition of comprehension is not unlike the blind men's description of an elephant.

Another issue which has surfaced recently is the relationship between memory and comprehension (Ortony, 1978). Basically, Ortony (1978) argued that one can remember information which is not understood and conversely, one often understands information but does not commit it to memory. Thus, we can discuss comprehension as an "on line" understanding, without addressing long term retention of what is understood. We often experience this in everyday

conversation. For our purposes, however, we are concerned with comprehension *and* memory since most schooling is aimed at the long term impact of learning. The measures we will present all have a memory component, that is, information obtained from prose must be retained and retrieved to complete the tasks.

### MEASURES OF COMPREHENSION

#### Free Recall

Perhaps one of the most popular measures of comprehension and memory for information in text is free recall. In this task, subjects are provided with minimal cues and asked to tell or write all they can remember from a text. This measure depends more on memory ability than most others, and is often criticized as not really measuring comprehension. While this may be the case in some instances, if scored properly, free recall can provide a wealth of information about how the subject organized information from prose and the kinds of relationships established between concepts.

Early on in the study of comprehension of prose, Bartlett (1932) used free recall to measure the impact of the familiarity of a story to a subject. He observed that for stories containing unfamiliar episode structures and content, subjects tended to produce distortions of the story information in their recall. Bartlett (1932) took this to mean that in free recall, subjects' familiarity with textual information impacted on their understanding. Others have more recently observed this result (Anderson & Pichert, 1977; Brown, Smiley, Day, Townsend, & Lawton, 1977).

Meyer (1975) has shown that the structure of texts also impacts on subjects' free recall of information from those texts. Again, if one merely counts how much is recalled, a measure of memory, *not* necessarily comprehension is obtained. Dunn, Mathews, and Beiger (Note 1) have shown that when relationships between concepts in the text structure are considered, a qualitative measure can be obtained. Since Dunn et al. observed differences in the particular relationships recalled by children with various general ability levels, they inferred that differential comprehension existed.

In a broader sense, free recall reflects one set of processes identified by Kintsch (1974) as component parts of a general theory of comprehension. When asked to freely recall information, we probably engage in at least a two-step process. First we have to search our memory for the desired information. Upon locating some potentially appropriate information, we then engage in a sort of hypothesis-testing exercise in order to determine if the information actually is the appropriate information. Up to this point we are engaging in a memory search, not necessarily comprehension testing. We do have information that suggests comprehension directly impacts on these memory activities. First, if information is "meaningful" to us, we are more likely to retain it and retrieve it than if it is meaningless. This follows Ausubel's work (1965) on meaningful learning. Secondly, the organization and interrelationships between concepts in memory probably are related to our understanding of that information, and certainly impact on our memory for it. This measure (organization and relatedness of information) can be obtained from free recall using any number of the text grammars now popular.

The criterion task of free recall then, provides us with information regarding the organization of concepts from prose, the relationships between concepts, the amount of information retained. Comprehension defined in terms of free recall provides information about how the subject organizes and relates information acquired from prose and further, how much information is accessible with a minimal amount of cues or "hints."

## Probed Recall

Probed recall is also among the most used measures in research on comprehension of prose. Basically stated, in this task, some probe (typically a question) is made of the reader's recollection of information from prose. There are numerous studies concerned with the nature of specific types of questions and their impact on recall (e.g. Rothkopf, 1980). One commonality among these question types is that the reader is provided with a "hint" or clue as to how the required information is related to other information in prose. For example, if a particular question requested the name of a city in a story, the subject might assume that there was a city mentioned in the story and that its name was mentioned. Here the reader is given a clue as to what specific information is needed. In free recall, the reader is left to personal mental devices to determine what level of information is required and to determine when the "bank" of information is exhausted. Probed recall is more narrow in scope and is used to test for the presence of particular information in memory.

Psychologically, probed recall can be viewed as providing the reader with some direction for a search strategy. This task assesses the availability of information in memory. That is, a means to *access* the information is provided (the probe) and the reader, basing a search on the probe, determines if the information is available in memory. In this case the criterion is provided for the reader.

Again, depending upon how the probe is constructed, this measure may tap either memory *and* comprehension or primarily memory. For instance probe questions which are constructed to elicit the gist or topic of a passage require some level of comprehension beyond memory since the topic or gist may never be stated explicitly. On the other hand, probes which are constructed to obtain "fact" or detailed information probably require memory with little or no comprehension. One extreme example of this type of probe is the cloze procedure. In this case, the context around a word is provided and the reader is asked to recall the appropriate word. This is perhaps the most explicit method of probing the reader's memory. Clearly, there are many levels of probes and the two described represent what might be called the extreme cases. Further, no matter what level of probe is presented, some level of memory and some level of comprehension are required. The interplay between them varies.

In addition to the type of probe, probed recall is impacted by text structure and the reader's familiarity with the text as was free recall. Meyer (1977) has provided data which supports the impact of text structure on responses to probe questions. Meyer (1977) parsed information in passages into levels of importance and asked readers to respond to probe questions designed to tap information at the various levels. She found that probes aimed at important information received more correct responses than probes aimed at less important information—usually details. This impact is similar to, although probably not as dramatic as, that observed in free recall.

Probed recall has also been used to assess the impact of familiarity with a text. Brown et al. (1977) found that with different levels of prior knowledge about a text, their subjects responded differently to certain probe questions which forced the subjects to draw conclusions about a story. Further, Mathews (Note 2) in a recent study found that overall performance on probe questions was enhanced for subjects with prior knowledge about the text relative to subjects who had no such knowledge.

Probe questions provide the reader with guidance in searching for certain information acquired from text, and generally are less demanding than a free recall task. The level

of complexity and generality of the probes determine how demanding the task is for the reader. Further, performance varies as a function of text structure and familiarity with a given text. Probed recall, given the appropriate level of question, is a means of assessing comprehension without placing the demands of a free recall task on the reader. It is, although, less sensitive to the organization of and relationship between concepts acquired from prose.

## Recognition Memory

Recognition memory is perhaps the most common technique used to assess comprehension in standardized tests. In this task, readers are presented a question or statement and asked to determine if a response presented to them is an appropriate response. We often encounter these items in multiple-choice formats where the proper response is embedded in a list of four or five options.

This task is perhaps the least demanding in terms of mental gymnastics. Kintsch (1974) has proposed that in evaluating a recognition memory task, all one needs to do is scan the contents of memory to determine if the response presented matches with information in memory. Typically, recognition memory is probably most dependent on memory and only slightly influenced by the level of comprehension. There are instances in which comprehension *can* play the major role, but this will be discussed in the section on *Inference Making*.

Generally, recognition memory for information in text is not influenced significantly by the organization of text. In a study on recall of word lists, Naus, Ornstein & Kreshtool (1977), found that recognition memory was not influenced significantly by rehearsal of organizational strategies. Recognition memory does appear to be influenced by prior knowledge about a given text. Brown et al. (1977) found that if a distractor consistent with a subject's prior knowledge about a text, but not from the text, was presented with a sentence from the text, the subject often times selected the distractor as being from the text. This effect was greater for young children than for older children.

Another variable which impacts on performance on recognition memory tasks is the characteristics of the items and distractors presented with them. One aspect of the relationship between the item and distractor which impacts on performance is similarity of meaning. Bransford and Franks (1971) demonstrated that if a distractor item is similar in meaning to the correct response, the distractor item is often mistakenly judged to be the correct response. Presumably, the converse is also true. That is, that the more disparate the items, the more accurate the judgments will be.

Recognition memory requires relatively little mental gymnastics compared to free and probed recall. Its primary use in the study of comprehension might be to assess whether or not subjects retain information sufficient to judge whether or not an item was encountered in a text. The psychological processes involve evaluating a match between an item on a test and the contents of one's memory. The subject does not have to generate a response (as in free and probed recall), and has explicit information as to what to search for in memory. In order to measure comprehension beyond that necessary for veridical recognition, items and distractors must be constructed expressly for that task. Specifically, in order to go beyond assessment of "pure memory," recognition of implicitly stated information or inferences must be tapped. The assessment of inference making will be discussed next.

## Inference Making

Recent interest in comprehension beyond literal memory has motivated researchers and practitioners alike to examine information which was implied by the text or generated by the reader in response to the text. This class of information falls within the general frame of inferences. Although there are several taxonomies of inferences, we chose to deal with inferences which are based on information in the text (e.g., John is taller than Jim. Jim is taller than Mike. Therefore, John is taller than Mike.) and inferences which are based upon information from the text and information in the reader's knowledge base (e.g., John hit Jim. From our knowledge of hitting we infer: Jim was hurting).

Free recall, probed recall, and recognition memory tasks can all be used to assess inference making. In free recall, the contents of the free recall are simply examined to determine if non-veridical information was based on information in the text of question or the knowledge base of the reader. In probed recall, questions can be structured so as to require the subject to go "beyond the information given." This extrapolation can be based either on information solely in the text or based on information in the text as well as the reader's knowledge base. Probed recall is more directive and produces a greater quantity of inferences than will be found in free recall.

Recognition memory tasks are used to assess inference making by creating distractors which represent possible inferences. Two ways of evaluating inference making are typically used with the recognition task. One is allowing subjects to determine if a possible inference is in fact recognized as coming directly from the text—an inference would be implied, not stated explicitly. A false recognition of the inference indicates that the inference was made. A second method used to test inference making in recognition tasks is to assess recognition of the truth value of a statement relative to the text. This allows the subject to evaluate the truth of a statement based upon the meaning of a text, not merely the explicitly stated information in the text.

It has been suggested that inference making is an indication of one of the highest levels of comprehension (Warren, Nicholas, & Trabasso, 1978). In order to make an inference, the reader must go beyond memory for information within a text and construct some new bit of information based upon expressed or implied ideas in a text. Recently, Kintsch has suggested that there are certain inferences which must be made if a text is to be interpreted as coherent (Kintsch & Vipond, 1979; Kintsch & Van Dijk, 1978). Further, Spiro (1977) has proposed that a significant amount of inference making is necessary in most retrieval tasks. He suggests that when attempting any form of memory task, the reader relies upon the interaction of information from a text and prior knowledge in the reader's memory. Virtually, every model of comprehension relies upon inference making to predict intelligent processing of text.

As before, text structure has been shown to impact on inference making. Kintsch and Vipond (1979) have suggested that when a text is disjointed, inferences must be made in order to establish its coherence. For example, in the sentence *John threw the rock at the window and it shattered all over the carpet*, we probably infer that the rock crashed through the window which caused the window to shatter. This type of inference allows us to establish a meaningful, coherent understanding of the sentence. This is accomplished without an explicit statement that the rock ever touched the window. Most would agree that the sentence was "comprehended" given such an inference.

Spiro (1977) has suggested that, like before, prior knowledge impacts on inference making. His research falls within the scope of a "schema theory" of comprehension. This theory predicts that a reader is pre-disposed to make certain conclusions—inferences if you will—given a certain level and content of prior knowledge. For instance, following the sentences: *All John's friends were at his surprise party. They gave him a number of nice gifts*, and given our knowledge of the usual impact of surprise parties and gifts, we can infer that John was pleased. Again, if a reader made this inference, most would agree that the sentences were "comprehended."

Inferences made to establish coherence in text as well as inferences made which relate a text to prior knowledge may be assessed via free or probed recall as well as recognition memory tasks. The difference lies in how the responses are scored and in probed recall and recognition memory, how the "test" items are structured. To detect inferences, the examiner must be willing to scrutinize "wrong" responses in free recall, ask "leading questions" in a probed recall, and provide carefully constructed distractors in recognition memory tasks.

One issue which bears discussion is that even if an inference is produced, memory for the premise statements from the text may be poor. In a recent study, Danner and Mathews (1980), found that when children identified an inference correctly, they did *not* necessarily recognize the appropriate premise statement. Further support for this position is to be found in a study by Spiro (1977). He found that when presented with information about a young couple's conflict over a decision to have a family, readers tended to freely recall information which was an incorrect inference and did not recall the correct information. That is, the readers tended to resolve the conflict by an incorrect inference.

Inference making requires some so-called active processing of information. It goes beyond veridical memory of information. Examining inferences provides a measure of how a reader interprets and integrates information from within a text or between the text and that reader's existing knowledge. What is lacking in this case is a measure of overall memory for information within a text, and how the reader has mentally organized information from a text.

## Measures of Processing

Recently, researchers have been investigating characteristics of processes of comprehension. The measures include: 1) Eye movements; 2) Reading time; and 3) Response latency. Although these measures do not tap comprehension directly, they do seem to be related to comprehension in a variety of tasks. Since we are concerned in this paper with measures which reflect more long-term retention, we will discuss these measures only briefly and suggest other sources which deal with them in detail.

*Eye Movements:* Advances in technologies have provided means of measuring miniscule movements of the eye. Recently, research has been undertaken in which eye movements have been recorded as subjects read texts. The inference being that certain types of eye movements were associated with characteristics of texts. For example, when we encounter an ambiguous pronoun in a text, the search for a clarifying noun is reflected by a scanning movement to a previously encountered noun. Many other variables have been investigated, but reviews by Carpenter and Just (1977), and Just and Carpenter (1980) provide a more detailed discussion and theoretical basis for the studies.

**Reading Time:** The amount of time a person spends reading a text has also been used to measure variables affecting various comprehension tasks. Kintsch (1974) used reading time to determine the impact of the number of propositions or simple sentence-like units. With the length of the text controlled, he found that the texts with more propositions required greater reading time than texts with fewer propositions. Kintsch (1974) has also related the number of propositions to recall of text when the reading time was constrained. Here he showed that with a fixed reading time, recall dropped as the number of propositions increased. Reading time here was used to assess the impact of certain text variables presumably during the decoding process. This in turn affected comprehension in the form of free recall. Kintsch (Chapter 6, 1974) provides a more in-depth discussion of this research.

**Response Latency:** This measure is used to obtain information regarding the time required for a reader to respond to some task demand. The basic format is one in which the reader is asked to verify whether or not some information is the same as or accurate with regard to a text. This usually takes the form of a recognition memory task. One such study (Danner & Mathews, 1980) used response latencies as a measure of when a particular inference was made. Danner and Mathews (1980) had children decide whether or not a sentence was accurate based upon information appearing in a story. The sentences were inferences based on two premise statements in simple stories. The stories were written such that the time to verify the inference would be shorter if the inference were made while reading than if the inferences were made at the time of the decision. The response latency data supports the *inference-during-reading* hypothesis. In this case, response latencies were used to assess when the comprehension process in question (inference making) occurred. Danner and Mathews (1980) provide a detailed discussion of this procedure.

## CONCLUSION

If we are interested in detecting how the reader has organized information retrieved from memory for a text as well as how much information can be accessed, then free recall is the measure of choice. Additionally, with this task, we can examine the nature of the inter-relationships present in the subject's recall.

The use of probed recall as a means to assess comprehension of prose allows us to tap various levels of memory and comprehension. The various levels are determined by the level of question. By level of question, we mean general vs. specific. That is, we can ask a question meant to tap the gist or topic of a passage or we can direct a question towards a specific fact in the passage.

Recognition memory is typically used to assess whether or not a reader retained information from a text. Again, the type of question will determine the level of difficulty of the task, but generally recognition memory is the least demanding of the tasks used to assess retention of text-based information. The recognition memory task can be used to tap many levels of information as could the probed recall task. The primary difference is in the amount of information provided to the reader to aid in the task of retrieving information from memory.

In order to determine whether the reader has gone beyond the information given, inference making is the measure of choice. Any of the measures discussed above may be used to assess inference making. In free recall, we simply examine the contents of the recall to determine if inferences were made. In

probed recall and recognition memory tasks, the items (questions) can be structured so that an inference must be made in order to accurately respond. The emphasis in an inference making task is not so much on accurate memory for the contents of a text, but rather on the integration of that information by the reader.

## Recommendations for Research and Practice

The researcher and the individual conducting diagnostic activities are at one level engaged in the same type of activities. That is to identify variables impacting on comprehension presumably defined by some task(s). Often times, single measures are used in both research and diagnosis. For example, free recall or recognition memory are often used as the single measure in research efforts (e.g., Meyer, Brandt, & Bluth, Note 3 and Bransford & Franks, 1971, respectively). In diagnosis, often a score below a certain level on a standardized test will enable a student to be placed in a remedial class. These tests most often rely on recognition memory in the form of multiple-choice items. In cases where several measures are used, it is most often the case that the materials to be read in the various measures are quite different making it almost impossible to draw valid conclusions across measures.

There are two solutions to this problem. One is to create equivalent materials based on the difficulty and structure of the texts. For an extensive treatment of readability measures and suggested alternatives, the reader is referred to Kintsch and Vipond (1978). This requires extensive materials development work and pilot testing, but is quite worth the effort. The other option is to assess the reader's retention and comprehension with more than one measure after reading a single text. Although this measure is somewhat problematic with regard to practice effects, we can obtain more complete information about the reader's mental representation and understanding of a text.

When multiple measures based on the same text are used, one way to reduce the practice effects is to present the measures in decreasing order of difficulty. Using this as a guide then, one might elicit free recall as a first task to assess the reader's organization of the information and the amount of information readily accessible with *no* probes. Since the only assistance this will provide the reader is a rehearsal of information already committed to memory, subsequent tasks will be relatively "pure." Following free recall, a probed recall, or recognition memory task can be administered. The items might be structured such that general as well as specific information might be tapped. Additionally, items can be constructed so that the ability to make inferences based on information from the text can be assessed. Further, the free recall data can be scored for the presence of "spontaneously" generated inferences.

In a recent study, Mathews (1980) applied such a procedure in assessing the impact of text structure and prior knowledge on retention of information from a text. This study employed two groups of subjects at two grade levels (fourth and eighth grade). One group at each grade received prior knowledge about a passage and one did not. Children in both groups listened to a target passage and then participated in two tasks—free and probed recall. The free recall was scored such that both the amount and organization of recall was obtained. The probes were written to tap specific information and elicit inferences from the children. Briefly, the results support differential effects of prior knowledge on the two tasks. For the fourth graders, the organization of free recall was different for the two groups, but the overall amount recalled was the same. The probe questions provided additional data which

revealed a difference. That is, the group receiving prior knowledge generally had a higher level of correct responses to the questions than did the other group. This was the case for inference as well as "fact" questions. At the eighth-grade level, the differences were not nearly as pronounced in the free recall task and non-existent in the probe recall task.

Based on the results Mathew (Note 2) concluded that for the fourth graders, prior knowledge affected the *organization* and *amount* of information retained. The organizational difference was detected in the free recall task. The lack of a difference in amount based on this task leads one to believe that the actual retrieval processes employed were not affected. The differences obtained in the amount recalled in a probe recall task indicate that in fact more information was available for the group receiving prior knowledge, even though that information was not accessible in free recall. Here, using various measures provided greater insight into the impact of prior knowledge than would be available using either measure alone.

The implications for diagnostic procedures seem fairly straight-forward. If the reader completes various tasks based on the same text, then a more complete picture of that reader's knowledge and understanding of the text can be obtained. For example, if the reader fails to recall a reasonable amount of information in a free recall task and performs adequately on a probed recall task, then remediation in retrieval skills, not reading *per se* might be suggested. If probed recall produces poor performance then a recognition memory task might be suggested. Basically, using this approach, we can determine whether deficits are in the organizational and retrieval skills of the reader (free recall) or whether the information is actually not committed to memory (probed recall or recognition memory). This would suggest attentional problems, memory deficit, or at the most basic level, decoding problems.

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## **REACTION: COMPREHENSION: BEYOND SINGLE DEPENDENT MEASURES**

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"Questions have been a mainstay of reading comprehension instruction for decades." (Pearson & Johnson, 1978, p. 154) The paper presented by Mathews and Camperell obviously recognizes the importance of the brief statement above, for they have done an in-depth analysis of the relationships between comprehension and various approaches to the measurement of comprehension. The authors have touched on a whole variety of related issues in such a way as to stimulate the thinking of practitioners and researchers alike, but in so doing have created a potential problem for readers. In this reactor's opinion, a reader of this paper needs to have a rather extensive knowledge of current theory in the comprehension area to make the connections implied by the authors.

For those not familiar with the work of people like Rumelhart, Pearson and Johnson, and Rystrom to name a few, the whole notion of "top-down" (concept driven) comprehension, "bottom-up" (text driven) comprehension, or "interactive" comprehension models is likely missing from their background knowledge, and therefore precludes an understanding of the intricacies suggested by Mathews and Camperell. For example, it is this reader's understanding that the statements regarding a subject's familiarity with textual

information impacting on his understanding of it reflect the position of "top down" theorists, and are better understood in the light of such theory.

Another minor criticism from this reader's viewpoint is the inclusion of the section on eye movements, reading time, and response latency. It would probably have been better to omit their discussion, as that discussion added little to the major thrust of the paper and was presented in a superficial manner.

Aside from those two criticisms, the overall impact of the paper is quite good. The analysis of measures and their relative uses was helpful, and the examples provided were clear. Of particular interest to this reader was the discussion about the problem in using several measures over materials that are quite different from each other. The authors contend that this creates a problem in drawing valid conclusions across measures. However, this approach seems to be a typical one in nearly any clinical setting, where a reading diagnosis might use a variety of tests and a variety of measuring styles. Or, as in the case of a test like the *Durrell Analysis of Reading Difficulty* — might require probed recall on oral reading and listening subtests and free recall on silent reading. Perhaps their analysis will open the way to new approaches to diagnosis and remediation in reading. As the authors said, "The promise of utilizing (these) tasks . . . as diagnostic procedures seems bright." I agree.

## REDUCING TEST ANXIETY EFFECTS ON READING COMPREHENSION OF COLLEGE STUDENTS

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The concept of test anxiety as a defined psychological syndrome is about 20 years old (Sarason, 1972). Since the inception of investigation, there have been several hundred articles reporting the genesis, functioning, and possible treatment of test anxiety. Currently, reliable differences between the high and low anxious student can be demonstrated by 1) physiological responses (Wark & Walch, 1974; 2) measures of affective state and trait (Liebert & Morris, 1967; Spielberger & Gorsuch, 1966), and 3) covert verbal responses (Hollandsworth et. al., 1979). These dimensions, body, emotion and internal talk, have been the basis for varieties of test panic treatment.

One of the earliest validated treatments for test anxiety was the behavioral approach of systematic desensitization (Wolpe, 1969). However, that technique for controlling anxiety, effective on other kinds of phobic responses, proved helpful but insufficient in the case of test anxiety. Test anxious students apparently need to learn not only how to relax, but also how to study more efficiently prior to testing (Mitchell, Hall & Piatkowsha, 1975). Both interventions were important; treatment that stressed one or the other was not as effective as techniques that used both (Allen, 1972). Recently, several cognitive components of test anxiety treatment have been isolated and used in successful therapy.

One, a cognitive-attention based intervention technique, was based on the work of Wine (1971). She pointed out that test anxious students tended to observe their own internal physiological disturbances, rather than attend to the item they were supposed to be answering. By teaching appropriate test-wisness and attention-focusing techniques, she was able to reduce test anxiety. Still more recently, Meichenbaum (1977) and Goldfried (1980) have drawn attention to the covert

internal self-talking that anxious students carry on while they are testing. Therapy is based on teaching students to revise their own internal dialogues.

Until very recently, the notion of test anxiety has not been of much interest to reading researchers working with adults, though there have been several studies of the impact of test anxiety on children's reading comprehension (Wildemuth, 1977). In the past year, however, several studies have focused specifically on the college reader. The first showed that high test anxious students have measurably lower reading comprehension than do relaxed students (Wark, Bennett & Wolinski, 1980). Additional research (Bennett & Wark, 1980) discusses how high anxiety may affect the adult's cognitive processes in reading. Anxious and non-anxious students do about as well on items that require a single fact taken from the paragraph in order to answer the comprehension item. But when compared to their more relaxed classmates, anxious students do much worse when required to integrate material from several different places. Anxious students tend to read in this characteristically limited way wherein details are noted, but overall comprehension is retarded.

This paper reports an attempt to integrate previously used treatment techniques and the authors' speculations about cognitive processes under anxiety, to develop and evaluate a treatment technique for anxious college readers.

### Subjects

The subjects for this study were enrolled in the four fall and winter quarter sections of an Efficient Reading course at a large mid-western university. The course is a popular, elective academic offering presented through the Department of Rhetoric. There were a total of 84 women and 85 men in the classes. About 10% were freshmen, the rest ranging from sophomores through graduate students. This group can be thought of as a representative sample of middle-range students in a large state institution. As part of the introductory phase of the class, each student took either Form E or Form F of the *Nelson-Denny Reading Test* (Brown, Bennett, & Hanna, 1980), and the 16 item form of the Test Anxiety Survey (Sarason, 1958).

### Treatment

At the second meeting of the class a therapist was introduced to the students. He had no prior information about their reading pre test scores. He explained the nature of test anxiety, interpreted the score on the Sarason instrument which the students had taken, and offered to meet in a specific room three times a week for two weeks to conduct a treatment program for test anxiety. Students were informed that the program was experimental, but that it should have some impact on their ability to comprehend material used in the Efficient Reading class. Any volunteers were asked to commit themselves to attend all 6 sessions. Students who signed up for one of the available hours became the experimental group.

Students who were motivated for help, but were not free at the particular hours that treatment was offered, were asked to sign up and indicate when they could participate. The therapist suggested that if possible other sections of the treatment program would be opened. The students who signed up for the "possible" section constituted the motivated-but-not-treated control groups.

The motivated volunteers whose schedule allowed time (N = 8) received the following treatment:

Day 1 — Share experiences in the group to develop some support and rapport, learn the rationale for the treatment, practice relaxed diaphragm breathing, and begin progressive relaxation.



Day 2 — Review diaphragm breathing, develop whole body cue controlled relaxation. The students were presented with a standard reading anxiety hierarchy, to be used for systematic desensitization (Wolpe, 1969). The hierarchy, based on increasingly difficult reading as defined by the Flesch scale, was used by all the subjects. The standard hierarchy is presented in Figure 1. However, each subject assigned subjective units of discomfort to the scenes as seemed appropriate, and added items at the top or bottom of the scale if desired.

Day 3 — Relax the whole body. Discuss the rationale for systematic desensitization of reading problems, and do scenes 1 and 2. The criterion was 2 presentations of 10 seconds without anxiety.

Day 4 — Relax, do scenes 3, 4, and 5, discuss the rationale for finding the main idea in a paragraph as a way to counteract anxiety, and do main idea exercises (Gilbert, 1966).

Day 5 — Relax, do scenes 6 and 7, review the main idea patterns given as homework, and do *Reading For Understanding* exercises (Thurstone, 1959), including writing down covert comments. The *Reading for Understanding* materials were used because of one important characteristic of these exercises — that readers must attend carefully to the text, understanding the sense of the *total* paragraph in order to correctly complete the exercise. Prior research, (Bennett & Wark, 1980) suggests that high anxious students need practice in reflective or "overall comprehension." The student's covert comments were analyzed to look for negative self-comments and to help students rewrite positive support self-comments for use during test taking.

Day 6 — Discuss the covert comments from Day 5, and develop a self directing script to counteract negative comments and anxiety. Minimally, the script would contain instructions to A) "Be calm," B) "Breathe from my stomach," and C) "Look for the main idea."

The 6 hours of treatment were designed to use interventions proven effective in investigations of test anxiety. The first 3 hours were devoted to relaxation and systematic desensitization for any fear of reading. During the 4th and 5th sessions, students were taught a necessary skill, reading the paragraph as a unit. Traditional test anxiety treatments focused on more general study and test taking skills. But for this research, designed to reduce anxiety effects during reading, there is a specific required skill. In the 6th session the students were introduced to a cognitive intervention: developing their individualized script to integrate previous learning and prompting themselves in anti-anxiety techniques when taking a reading test.

Following the 6th treatment day, all students in the Efficient Reading classes took the Comprehension section of Form C of the *Nelson-Denny Reading Test* (Brown, 1973) as an in-class exercise and posttest. Before administering the test, the instructor reminded the students who had been in the test anxiety treatment to use whatever skills they had learned in the program.

## Results

A control group of 8 students volunteered for treatment but were not available during the specified hours. But they were motivated for improvement. Their anxiety scores ( $M = 7.6$ ) indicated they were only slightly more test anxious than the classes as a whole ( $M = 6.7$ ). Because the different sections of the class had taken either the Nelson-Denny Form E or Form F as a pre test, all comprehension raw scores were converted to standard scores for comparison. The control subjects had a pre test ( $M = .254$ ) slightly higher than the total group. In summary, the control group can be characterized as slightly

anxious, competent readers, willing to spend extra time to improve their reading.

There were 8 students who had the time available to be in the treatment group. They had a much higher level of anxiety ( $M = 11.25$ ) than the control group. As a point of comparison, students who score at 11 or higher on the Anxiety Test should be considered for special assistance, since anxiety probably reduces their reading comprehension score (Wark and Bennett, 1981). Their comprehension standard scores ( $M = -.475$ ) were in fact well below the class average, confirming their need for special help.

The treatment effectively increased the comprehension scores for motivated test anxious readers in the experimental group, compared to the motivated-but-not-treated control group. Initially, the two groups did not differ on the pre test reading scores,  $t(14) = 1.036$   $p = .84$ . The experimental groups increased .573 standard scores, pre to post. This was significantly greater than change for the control group, which in fact dropped .102 standard scores. The difference, reported in table 1, was significant,  $t(14) = 2.053$   $p = .02$ .

Table 1

## RESULTS OF READING ANXIETY TREATMENT PLAN

Group	N	ANX	Pre Standard Score	Post Standard Score	Difference Standard Score
Experimental	8	11.25	-.475	.098	.573
Control	8	7.6	.254	.151	.102

$$t(14) = 2.053 \quad p = .02$$

## Discussion

This study clearly supports the notion that high test anxiety lowers reading comprehension for adults. The data are consistent with prior research on test anxiety in general, and reading tests in particular (Wark, Bennett & Wolinski, 1980). The finding is of some value to the methodology of test anxiety research. External criteria in much previous research has often been highly controlled, but irrelevant, tasks like anagrams. On the other hand, researchers have used changes in grade point average or other important measures contaminated with large amounts of uncontrolled variance. Reading comprehension items seem to offer a mid-range, relevant and interpretable activity.

The treatment program had a positive effect on comprehension. The gain was congruent with other studies involving cue-controlled desensitization (Lent & Russell, 1978), self instruction (Meichenbaum, 1972) and specific skill training (Wine, 1971). The specific skill in this study was that of "seeing" a whole paragraph, a skill chosen for effectiveness on the basis of its presumed relevance to a model of reading under anxiety.

There was one other treatment variable, so far not mentioned in the literature. At the time of the post test, the examiner gave a specific reminder to the subjects to use the anti-panic techniques they had learned. Perhaps a lack of such reminders in prior research accounts for the finding that anti-panic treatment tends to be successful in reducing self reports of anxiety, but not in generalizing to the classroom. The role of positive prompting before testing should be investigated more thoroughly.

The reader will no doubt consider possible biases in the selection of the experimental group. The sample size ( $N = 8$ ) immediately raises questions of reliability and generalizability of the findings. The major disturbance to the design was class time. Of the 16 motivated volunteers, 8 had conflicts at the time established for treatment; 8 did not. There is no reason to believe that class hour choice is a systematic variable. Yet there were non-random differences between the group. The experimental group was more anxious. But that difference would work against finding any positive effect from treatment. The experimental group had a lower, but not significantly different, pre test reading score. Again, that would mitigate against positive results. The fact that changes took place for even 8 students speaks to the robustness of the treatment effects. It seems reasonable to generalize such findings to other high anxious students who are motivated for change.

Figure 1:

### READING ANXIETY HIERARCHY

- \_\_\_\_\_ 1. Reading a comic book because it takes you back to the good times when you were a child.
- \_\_\_\_\_ 2. Reading a pulp magazine like a western or a romance because you want to relax or get away from a while.
- \_\_\_\_\_ 3. Reading an article in a slick magazine like *OMNI* or *REDBOOK* because the title catches your interest and you want to know more about it.
- \_\_\_\_\_ 4. Reading the cover article of *TIME* so you can be more current in your social conversation.
- \_\_\_\_\_ 5. Reading an article in a magazine like *ATLANTIC* so you can explain your political point of view.
- \_\_\_\_\_ 6. Reading an article in a technical scientific magazine like *SCIENCE* so you can discuss it in class.
- \_\_\_\_\_ 7. Reading a legal contract before you sign to make a big loan.

PLACE TABLE 1 ABOUT HERE

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## **THE COMPREHENSION OF MATHEMATICAL LANGUAGE, A COMMUNICATION APPROACH**

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### **Introduction**

If newspapers, magazines, and professional journals may be considered representative of the educational concerns of our country then, reading, writing, and arithmetic test scores are certainly in a priority position. Whether scores are actually declining, remaining the same, or increasing slightly, education has been hit with a "back-to-basics hysteria" (Greider, 1979, p. 24) and schools are being asked to focus once again on the teaching of reading, writing, and arithmetic (including basic operations, geometry, algebra, sets, etc.). In most classrooms reading and mathematics are considered separate subjects with little carry-over from one to the other except in the area of word problems. The purpose of this paper is to suggest a means of relating these two areas and ultimately enhancing the students' comprehension and understanding of mathematics.

## Rationale

Although opinions as to the exact definition of reading may differ, most educators would agree that the reading process involves the perception, interpretation and evaluation of the printed symbol (Lapp & Flood, 1978). Carroll (1976) suggested that "the essential skill in reading is getting meaning from a printed or written message." (p. 11). With today's emphasis on making mathematics more than a matter of rote memorization where "2 'n 2 'r 4" and "4 'n 4 'r 8" mathematics in essence may become an aspect of reading as it involves the perception, the interpretation, and the evaluation of a printed symbol. When one reads the symbol "cat" hopefully an image of the appropriate animal is evoked. Likewise, when one reads the symbol "2" hopefully an appropriate image of more than one but less than three is evoked. Are the two processes as distinct and discrete as we tend to treat them in the separation of reading and mathematics? When children are able to ascertain the meaning of symbols such as "Dogs and cats are animals." or "Boys and girls are children." we say they are reading. When they are able to ascertain the meaning of the symbols " $2 + 4 = 6$ " or " $7 - 3 = 4$ " we say they are doing math. Is there really a difference?

In reading, the cloze procedure may be used to evaluate or teach comprehension. Sometimes there is only one correct answer as in the case of "\_\_\_ am in the room." and sometimes there are a variety of correct answers as in the case of "The \_\_\_ chased the cat." Similarly, mathematics uses expressions such as " $2 + \_\_ = 7$ " which have basically one correct answer although it may be indicated by different symbols (e.g. 5,  $10/2$ ,  $20/4$ ) and expressions such as " $2 + \_\_ > 7$ " which have a variety of answers. Again, one might ask if there really is a difference.

Examples such as the preceding would indicate that the perception, interpretation, and evaluation of mathematical symbols is not a distinct and separate process. Why then is the reading of symbols such as "2" and " $2 + 2 = 4$ " treated differently from the reading of the symbols "dogs" and "Dogs and cats are animals."?

It has been suggested that to many people mathematics is essentially "something done in school according to someone else's rules" (Jencks & Peck, 1975, p. 371). Math makes little sense and becomes very similar to word calling. One can accurately pronounce all the symbols but has little understanding of the underlying message, little comprehension.

Hands-on experiences have been advocated but something is still missing. What appears to be needed is a method which focuses on the message of such sentences as " $2 + 3 = 5$ " and " $6 - 4 = 2$ ". A method which focuses on the communication symbolized by the sentence.

## Communication Approach

In recent years Dinnan and Lodge (1976) have outlined a framework for reading instruction which focuses on the message, the communication represented by the printed message. They suggest that all words can be classified as matter or relation references. Matter references being those referring to objects which have volume and weight such as "boy," "chair," and "lamp," while relation references indicate time, space, amount, and quality. Sample time references include "is," "was," and "then;" sample space references include "in," "out," and "near;" sample amount references include "one," "some," and "all;" sample quality references include "good," "bad," and "well." Dinnan and Lodge further suggest that communication basically involves the location of matter references in terms of time, space,

amount, and quality relations. The more definitely the sender (be he speaker or writer) locates the matter references for the receiver, the more accurate the communication. Those references not defined by the sender must be supplied by the receiver and can result in miscommunication.

Students are taught to identify and manipulate matter and relation references in order to ascertain the intended message. Using this approach, reading is a meaningful process of identifying relationships, a communication process.

## The Reading of Mathematics

In order to determine whether or not this framework could be applied to mathematical language and subsequently symbolic sentences an investigation of the language (both words and symbols) of seven mathematics series published within the last five years was conducted (Sullivan, 1980). Using the definition of mathematical symbolic sentences offered by Heddens (1971) which suggested that symbolic sentences are expressions such as " $2 + 3 = 5$ " consisting of "two or more names for numbers or sets joined together by a relation symbol" (p. 138) the investigator proceeded through 49 textbooks recording the various symbolic sentences found there and the words used to "orally" read them. (Table 1 contains several examples.) These sentences were then used to ascertain the relations (same-different and many-few) between the words and symbols used in mathematical symbolic sentences and the Dinnan and Lodge (1976) matter-relation classes.

The analysis indicated that the matter and relation classes defined by Dinnan and Lodge (1976) were applicable to the words and symbols used in mathematical symbolic sentences. (See Table 2 for a representative example.) The number symbols and the words used to call them be they known values such as "2" or unknown values such as "y" represent the matter class. The remaining symbols represent relations. It should be noted that the matter references used in mathematical language represent matter in general and are not tied to specific objects. For example, in the sentence " $1 + 2 = 3$ ," "2" can be horses, cows, rocks, people, buildings, or whatever matter one might care to specify. The relation references needed in mathematics are fewer in number than the relation references needed in ordinary language. While one might need the relations of "sick-well" and "beautiful-ugly" in ordinary language these are not essential to mathematical language.

The next apparent question was whether or not these matter and relation references are used similarly in ordinary language and mathematical language. Dinnan and Lodge (1976) suggest that sentences are expressions of relations and that within a sentence relation references are used to locate matter. Analysis of a representative sample of mathematical symbolic sentences suggested that the same holds true for mathematics. Symbolic sentences contain time, space, amount, and quality references, and these relation references appear to be used to locate the matter references. Table 3 contains sample sentences from arithmetic, geometry, and algebra in which the matter and relation references have been identified.

## Implications

It has been noted that to many people mathematics is "something done in school according to someone else's rules" (Jencks & Peck, 1975, p. 371). Use of the matter-relation class framework to teach students to determine the message intended by math symbolic sentences appears to have the potential to make math a meaningful communication rather than a series of symbols committed to memory. However,

while using the concepts of matter and relation words and helping children perceive the mathematics symbolic sentences as a form of communication in which the sender is locating matter references (in this case "1," "2," and "3," etc.) using relation references (in this case "=", "+," "1," and " ", etc.) care must be taken to insure that the approach does not become a matter of memorization. With this in mind, the following sequence for using this approach is suggested:

1. Establish the concepts of matter and relation references and their functioning in ordinary language.
2. Establish the specific contrasts needed to manipulate the mathematical symbolic sentences. Table 4 contains a listing of 50 words which were found to represent 51.5% of the 44,000 sampled by Sullivan (1980). These words might be considered a starting point. Caution is needed with those words marked with an asterisk. Discrepancies between the ordinary language and mathematical language meanings of those words were found to exist.
3. Teach the students to identify the matter and relation references in mathematical symbolic sentences.
4. Teach the students to interpret and manipulate the references they have identified.

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Table 1

#### Sample Recordings of Symbolic Sentences and the Words Used to Orally Read Them

Symbolic Sentence	Oral Reading
$1 + 2 = 3$	one plus two equals three one add two equals three one plus two are three one and two is the same as three
$5 - 1 = 4$	five minus one equals four five take one is four five take-away one is four five minus one is the same as four

Table 2

#### Classification of the Words Suggested in the Textbooks to be Used in Reading Selected Symbolic Sentences

Symbolic Sentence	Words Suggested for Oral Reading of the Sentences and their Classifications
$1 + 2 = 3$	$M^* r M^* r M^*$ One plus two equals three.
$1 + 2 = 3$	$M^* r M^* r M^*$ One and two are three.
$7 > 3$	$M^* r M^*$ Seven is greater than three.
$3 \times 4 = 12$	$M^* r M^* r M^*$ Three times four is twelve.
$3 \times 4 = 12$	$M^* M^* r M^*$ Three fours equal twelve.
$\angle ABC \cong \angle DEF$	$M^* r M^*$ Angle ABC is congruent to Angle DEF
$B \subseteq A$	$M^* r M^*$ Set B is a subset of Set A
$4 \text{ qts. } \approx \text{ } L$	$M^* r$ Four quarts is approximately equal to $M^*$ how many liters?
$M^*$ represents mathematical matter reference, r represents relation reference.	

Table 3

**Location of Time, Space, Amount, and Quality Relations  
in Mathematical Symbolic Sentences**

Sentences	References	
$3 + 2 = 5$ $5 - 3 = 2$ $3 \times 4 = 12$ $6 \div 2 = 3$	Matter:	Matter is represented by the symbols "2," "3," "5," etc.
	Time:	The order and sequence relations between the matter references are signaled by the spatial position of the symbols to each other.
	Space:	A together-apart relation is indicated by the "+," "-", "x," and "÷" signs. These signs signal the direction of matter references relative to each other.
	Amount:	The amount relations in these sentences are represented by the "=" sign and reflected in the number of matter references being located.
	Quality:	A quality relation is not always present in these sentences. When it is present, it is reflected in the ">" and "<" signs.
$8 = \frac{2y+16}{10}$ $3X = 3 = 24$	Matter:	Matter is represented by such symbols as ".8," "2y," and "3X."
	Time:	As in the previous sentences, time is reflected by the spatial relations of the symbols to each other.
	Space:	A together-apart relation is indicated by the signs "+," "x," "-", and "-". These symbols signal the direction of the movement of the matter references relative to each other.
	Amount:	Amount references are reflected in the equality (=) sign and the number of matter references present in the sentences.
	Quality:	Although not present in all sentences, quality references are represented by such symbols as ">" and "<."
$\triangle CAB \cong \triangle DEF$ $\overline{AB} \perp \overline{CD}$	Matter:	Matter is represented by such symbols as CAB, DEF, and AB.
	Time:	No explicit reference to time is contained in these sentences. However, the words used to read such signs as "≅" and "⊥" suggest it is the present time.
	Space:	The spatial relations between the matter being considered is reflected in signs such as "⊥" or "  ." The "△" and "≅" symbols reflect the spatial relations within the matter references.

**Amount:** The amount relations are signaled by the "=" sign and the number of matter references present in the sentence.

**Quality:** The quality relation within the matter reference itself is implicit in symbols such as " , " " , " and " . "

**Table 4**

**Rank Order Listing of Top 50 Words**

the	can	that
*of	this	find
*to	tens	ten
*is	look	set
a	each	five
and	*on	as
*one	three	us
*are	it	or
*in	we	*with
*how	ones	there
*many	page	numbers
what	your	use
two	*by	numeral
you	write	which
*at	hundred	*more
*for	four	do
number	who	

prehension of the fundamental language used in mathematics texts as it relates to matter-time-space-amount, and quantity, should increase competency in this area.

In many classrooms, much active emphasis seems to be placed on the simple computational process rather than the thought process about problem solving. Computation basically involves competency through practice procedures while problem solving involves comprehension of the problem and its solution. The implications of this study definitely placed major emphasis on the latter.

Publishers of mathematics texts might see implications from this research as a lead into helping teachers within the guidebook framework. Suggestions might be included in lesson plans to assist the teacher in developing and presenting these ideas and principles to students before and during the development of the problem solving process, and as mathematical concepts are presented.

It would be advantageous to have additional research on mathematics texts that were developed during that period in education referred to as "modern mathematics." During the "modern math" era, major emphasis by both mathematicians and texts focused on *understanding* the various processes involved in the mathematical world as they relate to problem solving. The admonition to "clean up our mathematical language" was heard from mathematicians. It is possible that more important than this is a need for a more thorough comprehension of the simple "little words" involved with the relationships of mathematical signs and symbols.

## REACTION: COMPREHENSION OF MATHEMATICAL LANGUAGE

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The research, results, and implications seem to be worthy of consideration by teachers as well as publishers of mathematics texts. Classroom teachers might become better acquainted with the basic framework and pedagogical method of the communication approach, thus enabling them to assist children in transferring the message conveyed by mathematical language and symbols. Since many students seem to lack the ability to determine the basic action called for in problem solving, a better understanding and com-



**EFFECTS OF REPRESENTATION AND  
ORGANIZATIONAL FEATURES OF TEXT ON  
SUCCESS IN MATHEMATICAL PROBLEM-SOLVING**

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JAMES H. WIEBE**

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Developing the ability to recognize and solve problems is an important goal at all levels of formalized schooling—from kindergarten through graduate school. Associated with meeting this objective are the tasks of identifying students' knowledge of skills related to problem-solving and determining effective instructional means for developing these abilities. In context of problem-solving in mathematics, Rasch (1960) proposes a simple model for describing the interaction which occurs between a student and a problem in mathematics: (1) the computational ability of the student, and (2) the difficulty of the problem. These two factors are incorporated algebraically into a probability model that operates on the principle that the more able the student is, the greater his or her chance of success will be; and the more difficult the problem is, the smaller the chance will be that the student will solve it (Wright, 1977).

Some anecdotal evidence exists which proposes that representing verbal problems in math pictorially may aid the student in processing the necessary information to appropriately solve those problems. Pauk (1974), Thomas and Robinson (1977), Sherbourne (1977), and Singer and Donlan (1980) suggest that by drawing an analytic data diagram or picture of the verbal problem students can visualize and clarify facts, principles, and relationships that are less evident from the words alone. In at least one study, some empirical evidence exists that using a drawing to illustrate pertinent information in a verbal problem significantly improves students' ability to solve the problem (Sherrill, 1973). But, in all cases, pictures were used as *aids* to help the student understand the verbal problem. No studies were found where

the three parts of the test followed the form *X is like Y*, while the other half specified the manner in which the things being compared were related, e.g. *X is as heavy as Y*. Care was taken not to include familiar similes such as *fat as a pig*, in order to avoid memory effects. The multiple-choice items had four alternatives arranged in random order: (1) correct choice, (2) attractive distractor, (3) irrelevant alternative and (4) an alternative opposite to the correct choice. Two adults independently categorized the multiple-choice alternatives into these classifications with 100% agreement. The appropriateness or inappropriateness of the judgmental items also yielded 100% agreement between the two raters.

Each day's similes practice materials contained one multiple-choice item, one judgmental item and one completion item.

Differences in pre- and posttest performance were analyzed separately for the three portions of the test by one-tailed *t*-tests for directional hypotheses.

Mean differences in pre- and posttest scores on the multiple-choice portion did not approach significance, although they were in the expected direction. Means were 13.9 and 14.5 with a computed *t* of .91,  $p > .05$ . It was noted that many posttest answers were identical with pre-test choices, indicating that the children may have remembered their initial selections. In the planned expansion of the study, alternate forms of the test would appear desirable.

The second portion of the test, in which the children were asked to judge whether similes were silly or not, showed a difference between pre- ( $X = 15.4$ ) and posttest ( $X = 17.0$ ) means that was significant ( $t = 1.93$ ,  $p < .05$ ). The experimental subjects apparently gained considerably in their ability to discriminate between appropriate and inappropriate comparisons.

The third portion of the test, which required the children to complete the similes with suitable terms, would appear to be the most demanding of the three, and it yielded the most interesting results. Differences between test means before ( $X = 27.00$ ) and after ( $X = 31.13$ ) treatment were significant ( $t = 3.0$ ,  $p < .01$ ). Answers were categorized as appropriate (2 points), marginal (1 point), or inappropriate (no points) by two adults, independently. Agreement was very high: in the few instances in which judgments varied, discussion resolved the issue.

The scores of the small control group actually decreased slightly from pre-test to posttest on the judgmental and completion tests. There was a slight gain on the multiple-choice test. None of these pre-test to posttest differences were significant.

The results of the study appear to indicate that, if a goal of instruction is to heighten children's ability to discriminate between superior and inferior examples of the simile and to create acceptable examples themselves, exposing them in a sustained, regular fashion to materials containing similes will substantially advance them toward that goal.

However, several caveats may be in order here. The exposure to these materials was quite standardized in terms of time and hence lacked spontaneity. Also, the practice materials were presented in isolation, apart from a meaningful context and thus were somewhat artificial in nature. While most of the children approached the similes sessions with apparent gusto, a few of the older and more creative children expressed the feeling toward the end of the experiment that the similes exercises were too much of a good thing. One especially talented fourth-grader commented, "Similes are like fleas." "Yes," her tutor retorted, "and you've caught them."

Perhaps a more beneficial course would be to ensure that

children, particularly the gifted, are surrounded by an environment rich in figurative language, but figurative language in the realm of children's literature, especially poetry. For those children whose language facility is somewhat less, periodic exposure to and discussion about these forms appears to be helpful.

Another result of the study, which may suggest caution, should be noted. In the third portion of the test, in which the children supplied the completing term of the simile, responses on the posttest were more convergent than those on the pre-test. This was particularly true of one of the kindergarten children, a girl notably proficient in her use of language. It would be distressing to infer that exposure to the similes exercises produced a sense that there was one "best answer" to what should ideally be a heuristic, divergent intellectual activity.

Further extensions of the study are planned, including an examination of children's processing of metaphors and a study of the development of figurative language abilities vis-a-vis Piaget's developmental stages.

## **ADOLESCENT LITERATURE AS A VEHICLE FOR DEVELOPING COMPREHENSION AND COMPOSITION SKILLS**

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This paper describes a technique for combining the effective processing of listening, reading and writing experiences by using adolescent literature in a middle grades classroom. Some significant publications about the comprehension process were connected with two descriptions for guiding listening, reading and writing activities and then applied to two novel procedures to produce the technique. The participating teacher and students evaluated the technique as successful in promoting comprehension. Success was also validated by an analysis of the final composition content.

### **Review of the Literature**

A brief review of the literature indicates that good comprehenders assimilate and accommodate as they comprehend (Pearson & Johnson, 1975). Good readers are more flexible in applying strategies which aid their comprehension and more integrated in their approach to comprehension (Golinkoff, 1976). Through a protocol analysis of reading strategies, Olshavsky (1977) confirmed that factors affecting comprehension are interest, reading proficiency, and author's writing style. These studies support the psycholinguistic position that reading is a problem solving process. Steig (1979), in reviewing several studies of comprehension, notes basic differences between good and poor comprehenders. When readers do not clearly understand the problem solving process, their comprehension is limited even when they can decode the words (Smith, 1967).

Cunningham (1975) has demonstrated how a teacher can guide children's comprehension using a directed listening activity which is then transferred to a parallel reading activity. The steps include: setting a purpose for listening; reading a selection to students; simulating the comprehension task which will be required of students after their reading; assigning children to read; having children complete the task as already demonstrated; conducting discussion. Smith and Bean (1980) explain how content area teachers can integrate

The results of a two-sample t-test for identifying differences between the Type I ( $x = 36.5$ ) and Type II ( $x = 29.9$ ) percentage problems showed a t-score of 3.91. At a p-value of .005, Type II "B — (A% of B)" percentage problems were found to be significantly more difficult than Type I "A% of B" problems.

## DISCUSSION

In response to the first question posed in this study, the data indicate that students' problem-solving success was not significantly affected by representing percentage problems pictorially. Evidently, the students who are able to compute percentage problems would not benefit from dealing with pictorially represented problem-solving situations before they are exposed to verbal problem situations. At first we were somewhat surprised to find that presenting mathematical problems pictorially did not significantly decrease difficulty. The subjects in our study, however, had already mastered the computational part of problem-solving. Prior support for representing mathematical problems pictorially has focussed on the marginally-successful student, and the representation has been viewed as an aid to improving problem-solving ability. A subsequent analysis of the data including students whose mastery of the percentage computations was marginal (e.g., between 50% and 70% on the computation instrument) might indicate that pictorial representation of mathematical problems aids less able students.

Turning to a discussion of the second question, subjects' problem-solving ability was powerfully affected by the presence of organizational features in the items. The subjects' scores on those items which included pertinent-only information were significantly higher than the scores on items which featured extraneous information. This finding supports the contention of Arter and Clinton (1974), Biegen (1972), Faford (1977) and others that success in problem-solving is dependent on effective channeling of pertinent features with sensitivity to extraneous information. In addition, we see this finding as an elaboration on the work done by Brown and Smiley (1977) and others who have concentrated their work on students' ability to extract meaningful information from non-problem-solving prose. Studies currently being conducted to examine learners' progress from immature to mature processors of text information provide promising procedures for studying problem-solving ability. Further studies are necessary which help to identify mature learners' awareness of the skills necessary to solve problems and to provide them a cueing system which aids in the development and application of those crucial skills.

For the third question, at present we are not able to identify a hierarchy of difficulty in problem-solving on the basis of representation and organizational feature. In this initial investigation, we determined that mathematical percentage problems which included extraneous features, whether represented pictorially or verbally, were more difficult to solve than those problems which included pertinent-only features and were also represented pictorially or verbally. Further, problems in the form "A% of B" were significantly easier than those of the form "B — A% of B". Thus, with these subjects, the level of difficulty of the type of problem along with the organizational features provided to the student accounts for the difficulty of the problem, not the representation.

Investigation concerning students' ability to problem-solve under various manipulations of representation and organizational features is just beginning. As we have noted by

the large number of students in this study who were unable to score successfully on the screening instrument, we cannot assume that ability to compute percentage problems is mastered prior to entering Algebra. Further studies involving percentages problem-solving will have to be conducted with students enrolled in more advanced courses. These studies which involve problem-solving have an exciting nature about them. The more we learn about what and how representation and organizational features influence the text difficulty of problem situations, the more able we will become to teach students how to solve problems.

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## REACTION: EFFECTS OF REPRESENTATION AND ORGANIZATIONAL FEATURES OF TEXT

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Analyzing basic problem solving from perspectives normally associated with reading provides insights, both for students of reading and mathematical problem solving. Unquestionably, both theoretical and instructional theories of mathematics and reading share a great many commonalities. An opportunity to look at one of these commonalities, namely word problems, has been provided in the research of Blohm and Wiebe. As you have noted, the researchers sought to answer three questions in their preliminary investigation. First, could pictorially presented word problems with only minimal but pertinent contextual cues (a data diagram, i.e., the equivalent of a structured overview), enhance or facilitate correct solutions? Second, could extraneous pictorial and contextual information affect students' abilities to solve word problems? Third, given the four experimental conditions—(a) pictorial representation with pertinent-only organizational features; (b) pictorial representation with pertinent and extraneous organizational features; (c) verbal representation with pertinent-only organizational features; and (d) verbal representation with pertinent and extraneous organizational features—would there be a hierarchy of experimental conditions affecting students' abilities to solve percentage math problems?

Before commenting on the research, several compliments would seem in order. Blohm and Wiebe have presented a preliminary research study which is clear, concise, inventive and open. The quality of the presentation could serve as a model for others and future replication.

The research, as good preliminary research often does, raises more questions about the variables in the study than it answers. The answers are: (1) for the sample, one of the two types of percentage questions was easier (2) for the sample, non-pertinent math information when added to either pictorially or textual presentations, does not seem to help solve certain percentage problems. It would appear that these conclusions can be supported, given the data provided and answer partially three research aims of the study. Now, a few of the questions. What part does computational ability play in the scheme of things (e.g., why 80%)? Could age, grade or percentage computational ability have been used as an independent variable? (There was probably a pretty healthy age range between the youngest 10th grader and the oldest 12th grader. However, data on the sample was minimal.) If the study procedures are to be followed in replication, one should anticipate that only about one-third of a 10th-12th grade population in Algebra I and II could obtain 80% correct on a simple percentage test like the one used in the study. Furthermore, if the experimental conditions are introduced before the screening device, there is no way to ensure that only one form might have been used by those few who meet the 80% correct criterion. Also, it is apparent that one of the two types of the percentage problems is obviously more difficult and that "piloting" the forms and the items might avoid future problems.

In summary, the Blohm and Wiebe study provides some answers (and a great many questions) to the mysteries surrounding pictorially and textually presented information in math word problems. One does not have to look too far in the literature of reading to find just as many questions being asked about the mysteries surrounding the use of pictures in stories to enhance or facilitate comprehension.

**THE EFFECTS OF INTEGRATING LANGUAGE  
AND SPELLING LESSONS WITH  
READING INSTRUCTION ON THIRD GRADE  
STUDENTS' ACHIEVEMENT IN VOCABULARY  
AND READING COMPREHENSION**

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Language arts instruction has for many years been a great concern to educators throughout the nation. In May, 1978, Ernest Boyer, Commissioner of Education stated, "We must recognize the centrality of language. Language is the connecting tissue which binds us all together." In recent years, there has been a great deal of interest in the interrelationship among the various language abilities. (Artley, 1950; Hughes, 1953; Winter, 1957) There have been many attempts at coordinating and integrating the language arts in an effort to improve achievement in these areas. (Stauffer, 1966; Stauffer & Hammond, 1967; Callaway, Mason, & McDaniel, 1972; Callaway, Mason, Salmon, & McDaniel, 1974)

Boehnlein and Retty (1977) in a review of the integration of the communication arts curriculum pointed out that while it is difficult to find empirical evidence of the superiority of one curriculum over another, most authors of language arts methods textbooks suggest an integral approach with stress on the individual needs of the child. This research project was an attempt at integrating the reading, language, and spelling instruction of third grade students at Lithia Springs Elementary School in Douglas County, in an effort to improve their achievement in the language arts.

There was a great concern among the third-grade teachers and the principal of Lithia Springs Elementary School, that the language arts program was not correlated to allow students to progress at their instructional level. Many of the students coming to the school in the third grade were reading below grade level, a half year to a year or more.

The instructional level of reading was assessed and students were taught at this level. However, all students were expected to perform assigned tasks from the third-grade language and spelling books. This caused some students to be greatly frustrated and doomed to poor achievement.

The purpose of this study was to compare the achievement of students whose language arts instruction was centered around their basal reading program with that of students being taught in a traditional language arts program using the reader, language book, and speller in separate sequences.

## **METHOD**

### **Subjects**

the pupils chosen for this study were all third-grade students from Lithia Springs Elementary School. The students were assigned to reading groups according to the reading level they had achieved the previous year and on the basis of previous teacher recommendations. The students were then randomly assigned to reading classes on their level. Scores from classes only in the middle range of achievement were tabulated. Thirty-six students comprised the basal-centered language arts program; one class of students was reading in the second grade, second reader, and one class was reading in the third grade, first reader. The traditional language arts program, 44 students, was made up of one class which was in the second

grade, second reader and one class that was reading in the third grade, first reader.

### Materials

Basic materials used in the language arts program were the system curriculum guide, county-adopted basal textbooks, and supplemental materials, both teacher-made and commercial. The curriculum guide and textbooks supplied the foundation for planning instruction.

The curriculum objectives for language arts had been referenced to the basal readers, language book, Georgia Criterion Referenced Tests, and the Wisconsin Design for Reading. Since it was referenced by page number, teachers were able to correlate instruction plans quite easily.

The Wisconsin Design provided excellent supplementary materials with its three components: word attack, comprehension, and study skills. The activities in this program helped teach and reinforce the language skills as well as the reading skills. It also provided a management system whereby skills attempted and mastered were recorded on individual record cards. Because of this, the teacher was kept aware of the students' progress as well as their needs.

Library materials were ample and readily accessible in the school. Films, filmstrips, newspapers, and magazines were available, as well as books for enjoyment and information. Overhead projectors, recorders and cassettes, and record players were also available for use by the teachers and students.

### Teaching Procedures

Four third-grade classes, originally 101 students, from Lithia Springs Elementary School participated in the study. Two classes were assigned to the experimental group and used a basal reader-centered language arts program. Two classes were assigned to the control group and used the traditional language arts program with reader, language book, and spelling book as separated sequences.

The *Comprehensive Test of Basic Skills* (reading and language subtests) was administered to the third-grade classes on September 25, 1978, and at the end-of-year on May 14, 1979. The students in both groups were taught their language arts program for two hours each day for 140 days.

The control group followed the traditional method of instruction. Language arts was divided into three distinct academic subjects: spelling, language, and reading. Basal tests were provided for each subject area.

Thirty minutes daily were allotted for spelling. The students were instructed using the series, *Basic Goals in Spelling*, (McGraw-Hill, 1968) which presented word groups which represented the most common spelling of English sounds and gave limited attention to uncommon spellings. Spelling words were presented in units; each unit was divided into 5 sets of activities, the fifth activity being the weekly spelling test.

The control group used *Our Language Today*, (American Book Company, 1974) as the language text. This book offered a balanced program in grammar, composition, literature, and linguistics with emphasis on practice. Language instruction was planned for a 45-minute period. The teachers taught the book chapter by chapter and used resource materials if the students needed additional practice.

Reading in the control group was taught using the second and third grade basal readers, *Shining Bridges, Better Than Gold*, and *More Than Words* (Macmillan, 1974). Teachers planned for a 45-minute period using the publisher's recommended lesson plans. The first segment included the building of background, vocabulary, preparatory exercises, and silent reading. The second segment was the guided oral

word

reading and teacher-directed activities (phonics, comprehension, study skills). Provision for individual differences and enrichment activities were the last segment of the lesson plan. Two or three days were required to accomplish the activities, depending on the students' achievement.

The experimental group spent the two-hour language arts block in an integrated program. Reading, spelling, and language were meshed into a single subject which students and teachers referred to as language arts. The same basal reading texts were used for the experimental and control groups. The difference was that the primary focus of instruction for the experimental group was the basal reader. Spelling books were not used, and language books were used when more practice on a specific language skill was needed.

The new vocabulary words for the stories in the readers became the students' spelling words. Teachers presented these words in the context of material to be read; then the words were used in oral activities, personal writing, or composition and skill-building activities as given in the teacher-directed activities and the curriculum guide. Spelling grades came from a weekly test of the vocabulary words.

Teachers planned language instruction using the specific skills presented in the teacher-directed activities. The skills were taught to the students and reinforced through practice in the language book. Vocabulary words used in spelling were also correlated with the language instruction. Careful attention was given to the program planned for the experimental group to insure that all the language arts objectives in the county curriculum guide were taught. Supplemental or resource materials supplied any missing practice.

Students in the experimental group read the stories silently after the background was built and preparatory exercises completed. Then, guided oral reading was done and language skills were presented using the teacher-directed activities. Independent and enrichment activities broadened the students' experiences. Two or three days were required to complete a story in the basal.

The test scores from the *Comprehensive Test of Basic Skills*, Reading Subtest Level 1 Form 5, (McGraw-Hill, 1974) for the experimental and control groups were compared at the end of the school year to determine if there was a significant difference in achievement between groups. Groups were compared for similarity using the t-test. Since the groups were not similar, analysis of covariance was used to analyze the final data.

### RESULTS

Scores were analyzed using analysis of covariance with the pretest score as the covariate, the instructional method (group) as the independent variable, and posttest achievement as the dependent variable. Table 1 summarizes the adjusted and unadjusted mean scores for the groups.

The analysis of covariance for reading achievement revealed no significant differences between the main effects by groups in vocabulary,  $F(1, 79) = .848, p < .05$ ; in comprehension,  $F(1, 79) = 1.99, p < .05$ ; and total reading score,  $F(1, 79) = 2.60, p < .05$ .

### CONCLUSIONS

The suggestion from the literature that a program which carefully coordinates experiences in language arts instruction should benefit students, was not confirmed by this study. Even though the experimental method might have capitalized

**TABLE 1**  
**Mean Scores From Reading Posttests**

Measure	Group	N	Unadjusted Mean Scores	Adjusted Mean Scores
Vocabulary	C	44	4.21	4.27
	E	36	4.19	4.11
Comprehension	C	44	4.37	4.60
	E	36	4.44	4.16
Total Reading	C	44	4.19	4.32
	E	36	4.17	4.00

on the strengths of both interrelated and traditional basal programs, the combined effect was no greater than the impact of the structure in a basal reader or the application practiced in interrelated experiences.

However, the question is due further investigation as more demands are imposed on instructional time, as textbooks become more expensive, and as proof of practice for life roles is demanded. The effects of basal-centered communications instruction on achievement in other subject areas should be considered, as well as the attitudes of students and parents toward instruction.

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## THE DEVELOPMENT OF CHILDREN'S COMPOSITION FOLLOWING TARGETED DISCUSSIONS OF A DISTINCTIVE LITERATURE SELECTION

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This paper presents a status report of a continuing study of the growth of children's composition after targeted discussions of children's literature. The assumption underlying the study is that active comprehension of a distinctive model of literature provides an awareness of the structure of narrative prose which transfers to the student's own writing. Guided verbal interaction focused on story elements brings about deeper understanding of prose construction.

### Rationale for the Approach

Teachers of language arts are sometimes caught between polar ideas: that writing is learned behavior—frequently inconstant and laborious, and that creativity in written expression should not be stifled by excessive formal instruction.

A middleground is suggested by Schiller (1970), Moore (1978), Hillerich (1979), and Blake and Spennato (1980) who propose that teaching the art of writing should occur within a conceptual framework often sequenced over specifically designated time frames. Most of these proponents of structured teaching of composition suggested a process which includes orientation and pre-writing experiences, idea production and generation, revision and editing, and product sharing.

If carefully sequenced instruction can facilitate the development of children's writing, can analysis of a worthy literary model, as a part of the instructional process, increase student awareness of story elements? Through discussion of author intent and style, can children transfer knowledge of literary models to their own creative writing? These questions are basic to the proposed teaching strategy which begins with appreciation of a literary work and continues with targeted discussion of story elements followed by student writing activity periods. It is assumed that students can grasp the elements of composition by observing the patterns employed in an excellent model, and that higher order questioning during discussion permits transfer to the student's original work.

Support for the procedure is found in discussions of active comprehension by Singer (1978) and Pearson and Johnson (1978) who emphasize the use of modes of questioning which are directed toward problem solving and which place a premium on satisfying reader curiosity. Lundsteen (1974) also advocates group problem solving discussions in which the process is controlled but not the specific content. In this procedure questions are formed to elicit transfer of ideas. Lundsteen believes that this mode of questioning helps children to learn, "to be persistent, to feel free to be original and open minded, to empathize, to think of the 'whys' and to communicate interactively." McConaughy (1980) cites evidence that children in the early and middle grades may need the help of specific probe questioning in order to focus on higher levels of story comprehension.

Relating reading comprehension to the structure of written prose is not automatic for individuals of any age. Gage (1978) suggests that students face difficulty in thinking of writing as a rhetorical process if they have not been taught to read rhetorically. He suggests that current reading comprehension instruction makes no distinction between meaning and

significance, and that students unable to make the distinction have difficulty establishing intent in their own writing. The procedure described in this study purports to help children to make these distinctions in order to develop more fully their own composing styles.

### The Writing Group

Subjects for this study are a group of eight seventh-grade youngsters at St. Benedict's School, Richmond, Virginia. The group of 4 girls and 4 boys are volunteers who agree to "keep up with any work missed" in the English classes from which they were excused to attend the writing workshop. Although no attempt was made to control intelligence or creativity variables, the group represents an ability range from gifted to low average and includes one diagnosed disabled reader. The students have previously had extensive instruction in traditional English grammar and literature, but have had few opportunities for creative writing. Socioeconomically, they represent the range of the white middle class in the Richmond, Virginia area.

### The Procedure

The procedure used to integrate comprehension of the literary model with writing performance employs the comprehension model of Goodman and Burke (1972) as an organizing format for questions. Verbal interaction strategies patterned after Ruddell's (1974) model elicit observations about story characters, character development, events, plot, and theme. Schiller's (1970) model for teaching the art of writing forms the basis for the corresponding writing activities following discussion sessions. Discuss periods of 15-to-20 minutes are followed by writing periods of 15-to-20 minutes. As the writing progresses, oral discussion is brief and informal, and writing is sustained for longer periods. No session exceeds 50 minutes in duration. Two of the sessions were videotaped for specific analysis.

The literature stimulus for the study is *Mrs. Frisby and the Rats of NIMH* (O'Brien, 1971), a Newberry Award winning book selected on the basis of timely plot and theme, development of strong nonstereotyped characters, and vivid description. A collection of unique objects including some oriental articles, a World War II Nazi armband, an unusual necklace, and a mood ring are stimulus objects for initial writing. Students are asked to write a story telling something about the object, who might have been associated with it, where it might have been found, and what events may have happened around the object. (Veitsch, 1977).

The following Outline presents the procedures followed in the "Listen, Discuss, Write" approach:

#### Suggested Procedures for Integrating Literature and Composition: Listen, Discuss, Write.

##### Step One. Initial Writing

1. Overview of the approach.  
(Middle school students deserve an honest explanation of the activities and tasks to be undertaken.)
2. Obtain a beginning writing sample or a "starter story." (15-20 minutes) Suggestion: Use the "Trap Door Method," by Tom Veitsch, (1977), (people, object, situation).
3. Present a synopsis of the literature model.  
Suggestion: use filmstrip or film presentation as an overview.

##### Step Two. Descriptive Writing

1. Review of initial writing.  
Identify characters or objects to be described.
2. Ask students to listen for descriptive words (related to senses) actions that characterize the individual work patterns that convey images.
3. Read selected passages related to character or object description.

4. Discussion of author techniques.
5. Relate to a character/object in your story.
6. Write a descriptive passage about your story character/object (15 minutes).
7. Story sharing.

##### Step Three. Developing the Plot

1. Read passages illustrating the events which precede the pilot.
2. Ask students to recall events, identify main event and note the relationship of story parts.
3. Discuss the order of events in their stories. Talk about various strategies for organizing the composition. Discuss the impact of the theme.
4. List the story events and story plot or subplots. (15 minutes)
5. Sharing.

##### Step Four. Elaborating the Initial Story.

1. Review previous steps taken.
2. Read "model" conclusion and share other story conclusions.
3. Discuss possible conclusions and the need to draw the story to a close after the climax.
4. Write the elaborated story (longer session).

##### Step Five. Critiquing the Story.

1. Students share stories in dyads or small groups and observe such aspects as vitality, logic, clarity. Changes are suggested.
2. Read story portions to focus on transitional elements, ordering.
3. Use sentence combining and paragraph linking techniques to develop fluency in student story samples.

##### Step Six. Refining the Vocabulary.

1. Reread literature model portions to focus on vocabulary selection.
2. Brainstorm to generate descriptive and appropriate word choices.

##### Step Seven. Editing the Elaborated Story.

1. Proof and edit.
2. Present in final polished form — typed and bound.
3. Share with appropriate audience.

Samples of student writing are gathered, logged, and filed at almost every session. Development of written expression is examined using a holistic scoring method (Myers, 1980) as opposed to primary trait, analytical scoring, or discourse scoring. Holistic scoring, according to Myers, assumes that, "... In a writing assessment students should write, and that error counts alone cannot accurately reflect competency levels." Holistic scoring includes establishing prototypes. Holistic scoring can yield a group profile of students showing the range of writing skill. A sample over time is needed to make a statement about an individual's writing competency. Criteria for feature analysis are adapted from Myers (1980) and Glazer (1972) and concentrate primarily on the elements of Narrative Composition.

### Analysis of Writing Samples

An examination of three writing samples reflect instruction and discussion directed to description of character and organization of story elements leading to the plot (See Table 1 for a summary evaluation). Early samples become anchor samples for later writing. As might be expected, the wide range of initial writing ability interacts with instruction to present varied individual patterns. Growth appears to be greater for less creative students who are adding new elements to their writing as a result of instruction. Internal logic remains strong throughout and supports the necessity for careful prewriting preparation. The areas of characterization and detail show increased attention in the second writing sample, which followed focused discussion on descriptive writing. Although sentence complexity and use of dialogue vary throughout as a function of individual ability and style, sentence coherence appears to be responsive to instruction.

Short writing periods limit a more detailed analysis at this

time. Student writing is just beginning to show evidence of attention to theme; yet most of the children have discussed thematic aspects of their stories. The short initial samples do not lend themselves to more quantitative analysis of discourse elements, such as T-units, and verb density. Later elaborated samples, may reflect more accurately the continuum of writing growth when compared with earlier samples. Total patterns analyzed holistically over time will add validity to the current assessment of elements of composition

## Discussion

Preliminary assessment of writing samples appear to confirm the procedure of "Listen, Discuss, Write," as a means of fostering the growth of composition skills for the group described. Although greater improvement is shown for less able writers, good writers also appear to profit from targeted discussion of narrative elements. Comments from students reflect a greater awareness of character description in their own composition and in the literature selections chosen for pleasure reading. Requests for extended writing periods followed the outlining of story events and beginning sessions of elaborated writing.

Although the formal critiquing phase has not begun, students are spontaneously sharing ideas and giving each other suggestions, such as names for new characters and places, vocabulary substitutions, etc. Self evaluative comments are increasing and are directed to specific elements; for example, Kemp observed that he should change his main character from a sorcerer to an emperor to be more consistent with the plot and events. Ida decided to rewrite her initial story, keeping the same idea but changing the setting and pattern of events to, "put the story in better order." Peter has concluded that he needs more historical and geographic accuracy in his story; consequently elaborated writing has been curtailed while some library research occurs.

As the sessions continue, students will engage in group interaction for purposes of revision. Spelling, grammar and transitional writing are not being analyzed at the moment because specific instruction will be directed to those aspects with attention again directed to the model. The focus of this study is on generation of ideas and on understanding narrative elements.

One recommendation for future replications of the study will be to include early attention to developing a "sense of audience." Kroll (1978) and Golden (1980) emphasize the need for experiences which help children to develop awareness of the audience to whom they are writing and to adjust a piece of writing to fit a particular audience. Questions such as, "Who is going to read your story," and "What will be most interesting to them," may give children a better sense of direction during initial writing stages. Interactive group responses also provide opportunities to create audience awareness in writing.

It is anticipated that the "Listen, Discuss, Write" approach will be one way to foster growth in children's writing ability in the middle grades. By combining successful strategies from the teaching of reading and the teaching of writing teachers can help students to grasp the view that communication processes are interrelated and exist in reciprocity to one another.

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### Scoring Profile for Three Writing Samples

#### Score Values

1 = none  
2 = little  
3 = much

Sample I: Initial Writing — starter story

Sample II: Focus on character description

Sample III: Beginning Elaborated Writing

Table 1

	Originality			Plot Beginning			Internal Logic			Detail		
Kristen	2	2	2	3	2	2	2	3	3	2	1	1
Anne	3	2	2	2	2	2	3	3	3	2	2	2
Janice	1	2	2	2	2	3	2	3	3	2	3	1
Ida	2	2	2	2	2	3	1	2	3	1	3	3
Wayne	1	2	2	2	3	3	3	3	3	1	3	3
Peter	2	2	3	3	3	3	2	3	3	2	3	3
Blaise	2	2	3	2	2	3	3	3	3	3	3	3
Kemp	2	3		3	3		3	3		1	2	

## THE EFFECT OF EXPOSURE TO SIMILES ON CHILDREN'S COMPREHENSION AND USE OF THE FORM

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Authors of great stories for children will not be bound by the constraints of vocabulary control or literality. Rather, they tell their tales with verve, precision and dash, leaving their young readers free to grasp what is meaningful. Witness Beatrix Potter's description of the attempt of some sympathetic birds to comfort the entrapped Peter Rabbit: "A flock of friendly sparrows flew to him in great excitement and implored him to exert himself." Or this, from Rowena Bennett's *Motor Cars*: They look like burnished beetles, black. . . ."

Indeed, this freedom from intellectual restraints, this mind-stretching quality has often been advanced as a reason for including the richly figurative materials of children's literature in the instructional programs of children.

The study reported here is an investigation into the abilities of elementary school children to deal with a particular form of figurative language, the simile, and to note changes in this ability as a result of regular, planned exposure to the form.

The study asked: (1) does regular, structured exposure to similes increase children's ability to process this form of figurative language? (2) What qualitative differences may be noted in children's responses to similes as a function of this exposure?

The subjects were children from four schools in urban Richmond, referred by their teachers for tutoring in reading.

The tutoring was done by undergraduate students enrolled in a diagnostic reading course. The majority of the children were referred for remedial purposes, but 6 of them were referred for purposes of enrichment. The children ranged from kindergarten to fifth grade level. Twenty students were originally placed in the experimental group, but because of transfers only 17 students in this group remained for the duration of the study. Twenty students were to have comprised the control group, which received treatment between pre- and posttests, but for reasons beyond the control of the writer complete pre-test and posttest scores were available for only 7 of the control group children.

The subjects (experimental and control) were given a 60-item test of similes constructed by the writer. The initial test was administered early in October at the outset of the tutorial session and administered again 8 weeks later. During the intervening 6 weeks the experimental subjects were presented with specially constructed similes practice materials at 2 tutorial sessions per week. The practice materials took no more than 5 minutes of the tutorial hour. For those children who were unable to read the test or the practice materials, the tutors read the items aloud and recorded the children's answers.

The similes test and the practice materials contained three types of items: multiple-choice, judgmental, and completion.

The first portion of the similes test was composed of 20 multiple-choice items, in which the children were asked to choose the best completing term. The second portion contained 20 items which the students were to judge as *silly* or *not silly*. The final 20 items required the children to supply the completing terms of the similes. Half of the items in each of

pertinent information in mathematical problems is presented in pictorial form. What would the effect on student achievement be if pertinent information in mathematical problems were presented in pictorial form? It may be that when students are able to carry out the necessary computational procedures presenting "verbal" problems in pictorial representation will decrease the difficulty of the problems and increase the probability that students will solve them correctly.

More is known about students' sensitivity to the organizational features of verbal material. Bruning (1970) studied pupils' factual recall for passages with both pertinent and extraneous information. He found that recall was significantly greater for passages which featured only pertinent information. A series of studies (Brown & Smiley, 1977; Brown, Smiley, Day, Townsend, & Lawton, 1977; Brown & Smiley, 1978) has focussed on students' ability to extract the major points from verbal passages. Results indicate that the more mature processor is able to attend to the pertinent, or most informative material while the less able student finds difficulty in ignoring extraneous, or less informative sections of passages. The practical aspect of these findings for success in problem-solving is evident. Effective channeling of pertinent information and sensitivity to extraneous details in verbal problems can insure successful problem-solving, again assuming that the students have acquired the necessary computational ability for those problems (Arter & Clinton, 1974; Biegen, 1972; Blakenship & Lovitt, 1976; Faford, 1977). To date, we are not aware of any prior studies where the combined effects of representing verbal problems pictorially and featuring pertinent and/or extraneous information on problem-solving ability was investigated.

In general, the purpose of this study was to begin examining the effects of manipulating the representation and organizational features of the problems on the students' ability to solve them. Specifically, this study examined students' ability to solve mathematical percentage problems when they were presented either pictorially or verbally including pertinent-only or pertinent and extraneous information. Once the students who demonstrated ability to compute percentage problems were identified, the following questions were investigated. Would students solve percentage problems represented pictorially more successfully than the identical problems represented verbally? Would these students solve percentage problems featuring pertinent-only information more successfully than those featuring both pertinent and extraneous information? And finally, would the combination of representation and feature result in a hierarchy of difficulty for solving percentage problems?

## METHOD

### Subjects

Two hundred thirty-eight 10th through 12th-grade students enrolled in an Algebra I or II course at five public high schools in Lafayette, Louisiana, served as subjects for the study. These subjects were identified from a population of 732 by having demonstrated 80% or better on a screening test of percentage computational ability in a non-problem-solving format. Algebra I and II students were used as subjects in the study because, typically, percentages are assured to be mastered prior to entry into these courses and because problem-solving is usually stressed in Algebra.

### Instruments

Data analyzed in this study were from student responses to items involving percentages on two instruments—a computational screening test and a problem-solving test. The computational instrument included 10 percentage items: one-half were the type "A% of B = \_\_\_\_\_" and the other half were they "B — (A% of B) = \_\_\_\_\_". These items involved only percentages less than or equal to 100%. They included no mixed percentages (i.e., no percentage numerals such as  $56\frac{1}{2}$  or 13.5%), and all items called for whole numeral answers. The order of the two types of items on the instrument was randomly assigned. Space was provided below each item for the students to show all their computations.

The problem-solving instrument included 10 items—two each in the following representations with these organizational features: (1) pictorial, pertinent-only information; (2) pictorial, pertinent and extraneous information; (3) verbal, pertinent-only information; and (4) verbal, pertinent and extraneous information. Eight different problem-solving situations involving percentages, four of the type A% of B = \_\_\_\_\_ and four of the type B — (A% of B) = \_\_\_\_\_, were devised to provide the basis for the items on the instrument. These eight problem-solving situations are briefly described below in Figure 1.

Figure 1

### Problem-Solving Situations for Percentage Problems

#### A% of B Problems:

Item Number	Description
1	Determine the interest on money placed in a savings account
2	Determine the tax to be paid on a restaurant bill
3	Determine the amount of weight reduced on a diet
4	Determine the amount of cheese eaten by a mouse

#### B — (A% of B) Problems:

5	Determine the length of jeans after a percentage of shrinkage
6	Determine length of board after a percentage of cutting
7	Determine liters of gas remaining after percentage used
8	Determine depth of lake after percentage of drop in water level

reading and writing using a guided writing procedure which "encompasses the four communication arts with a focus on the essential skill of writing." (p. 293). These two guides facilitate the development of comprehension and composition by providing clear directions about the tasks.

### Objectives

Middle and secondary grade students in English and reading classes are often required to read and then to demonstrate their reading comprehension by writing activities such as book reports. Yet, many students do not understand how to process their reading and writing to produce effective reports. In this classroom application, two procedures were employed to facilitate guided comprehension. The major objectives were to provide students with clear tasks for problem solving, a procedure for writing compositions, and exposure to a classic adolescent novel within a limited time. "Read a book in an hour" (Smith, 1979) was the main procedure for the development of listening and reading comprehension. "Hamburger writing" (Beyer, 1977) was the procedure for the development of composition.

### The Setting

The participants in the classroom technique were 22 seventh and eighth graders enrolled in a suburban middle school summer enrichment program. Since the program was only 4 weeks long, 5 mornings a week, and included students from several schools, both time and diagnostic information were limited. Students showed little interest in reading and said they had problems writing about what they read. The teacher introduced the technique as a possible solution. She suggested that the writing hint might be useful in their classwork next year as well.

### Procedures

The novel selected was *A Day No Pigs Would Die*, which has high appeal to adolescents and contains short, action-packed chapters. The theme is mature but the writing style is fairly simple.

As the first step in the lesson, the teacher introduced the novel by reading the title, showing the class the book cover, and sharing how impressed and moved by the book she had been. (She did mention that the book contained some "strong" parts and "raw" language, which were not for emulation but necessary to depict this story setting.) She asked students to generate expectations about the book content and to share any experiences they had had which might be relevant to these expectations.

The second step was to read aloud to the class the first chapter. A whole class discussion of their predictions followed. Chapter content was discussed orally by identifying each of the following elements:

Setting	Main Idea	Major Supporting Details	Major Characters	Conflicts
Field	trying to help cow give birth	teased by schoolmates; got stickers in backside	Robert Peck Edward Thatcher cow/calf	Edward making fun; cow being born

Next, chapters 2 through 12 were assigned for silent reading, two students per chapter. Chapter 13 was assigned to a teacher; 14 and 15 were to be read by all participants after the sharing of 2 through 13. Each group was to read to identify the elements used during the listening portion of the lesson. The discussion in the small groups after chapter reading was lively. All students understood the task, although

a few groups required assistance to identify some elements, such as conflict. In such cases, the teacher guided their re-reading of passages and encouraged students to think aloud after the re-reading; this guidance was similar to Olshavsky's use of protocol analysis.

On the second day of the lesson, groups shared their synopses of chapters by writing the identified elements on the board as they described each chapter.

As the fifth step, all students read chapters 14 and 15. The students then talked about their reactions to the book and to this manner of reading a book.

Sixth, "hamburger writing" was introduced by using a colorful poster of a hamburger and identifying: the top roll as topic sentence, the bottom roll as wrap up, the hamburger as the "meat" of the paragraph, and the condiments as the details and examples. Together the class identified the hamburger parts of this paragraph:

top roll	.....	Michael skipped school
ketchup,		He told me he was going to do it.
lettuce	.....	Sharon saw him outside playing.
meat	.....	He got caught by the principal.
bottom roll	.....	The principal called his parents.

Seventh, students were asked to write a composition using two hamburger paragraphs, describing *A Day No Pigs Would Die*. Some guiding questions were provided if they elected to use them:

paragraph 1 —	Respond to the activity of reading a book in an hour. Did you like the activity? What did you like best or least? Did it make you want to read the book?
paragraph 2 —	Describe your personal reaction to the book. Did you enjoy it? Why/Why not? Did it have special meaning to you?

### Evaluation

This lesson was not intended to be research oriented; it was an application of professional literature to classroom experience. Therefore, evaluation was conducted informally by assessing the reactions of teacher and students, and by analyzing the compositions for use of hamburger paragraphs and for indications of comprehension.

Twenty students were present to complete the composition. Tabulations indicate that 18 of 20 students applied the hamburger paragraphs; 2 simply listed statements. Seventeen students demonstrated comprehension of the novel by providing a theme statement or an example from the book; 3 wrote such general comments that it was not possible to determine comprehension. Sixteen students expressed favorable reactions to the lesson; 4 were unfavorable, as demonstrated in the selected comments below. Eighteen students expressed favorable reactions to the book; one did not care for the book (see comments) and one expressed no opinion. Although only three mornings of class remained when this activity was completed, the teacher reported that five students read the complete book during that time.

Three compositions are reproduced, as drafted, to illustrate the lesson more fully:

Tony:

I like this activity because we could tell you what we thought the main ideas was and we could explain what we read. I would like to do it again.

This activity was fun and interesting because Mr. Peck said that he would never again put a weasle in with a dog. Robert said that no pig would die on this day. I like what Robert said because he let no pig die on this day because his father died.

Anthony:

### A Day No Pigs Would Die

I did not like the activity because it did not have more action. If I could had read the book I would have enjoy it. But the activity did make me want to read the book.

I enjoy the book because it have more action. I would like read the whole book to get a good understand.

Kathleen:

I liked this activity because we learned about a new book. The way we did it everyone could learn about a book at the same time. The book made me want to read it. I liked the part about each person reading a chapter. I just loved the activity.

I would love to read the book. The part about when he got stickers in his privates was my favorite. I also like the part about the pervert. I just hope I get to read the whole book myself.

Selected comments are included to demonstrate varying reactions to the activity and to the book:

If I had read the book by myself, I wouldn't have finished it.

I really like the book. I wouldn't mind reading it.

I did not like the way we did the activity. I would prefer to read the whole book myself.

I wouldn't really want to read the book because it was sad and I don't like to read sad books.

The teacher was extremely pleased with the results. She felt that she had attained greater success than in other situations where she had assigned reading and writing activities. She has since used this lesson again with even greater satisfaction.

In the future, classroom research could be conducted to test the significance of this technique more objectively. Results of an assignment in which students have read a novel and then written a composition could be compared to results after read-a-book-in-an-hour and hamburger writing have occurred. In that way, the effects of guiding comprehension through listening to reading to writing activities, encouraging employment of effective comprehension strategies, could be measured.

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# THE EFFECTS OF CONCRETENESS AND IMAGERY ON PAIRED-ASSOCIATE LEARNING AND RECALL IN THE READING PROCESS

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Much research has centered on the manner in which a variety of verbal attributes influence learning. One theory that has received attention, particularly in the area of reading and comprehension, is the ability of a verbal item to arouse an image. The term *concreteness* has been used to describe this attribute, and research reports that this variable makes a significant contribution to learning when placed on the stimulus side of a paired-associate task.

Evidence supports the contention that mental imagery training enhances paired-associate learning. The results of research studies (Pavio & Yuille, 1967; Wolff & Levin, 1972; Pressley & Levin, 1980) indicate that instructions to create mental images from words strongly facilitates paired-associate learning. The results of Hall's (1971) study concur, stating that concrete imagery makes a more potent contribution to learning and recall than either meaningfulness or rote repetition.

Shepard (1978) defends the role of the mental image in human thought against critics who maintain that mental imagery is secondary or even peripheral to verbal thought processes; however, the value of mental imagery as a positive factor in reading comprehension is not well explored. Investigation with third through sixth grade readers found mental imagery instruction facilitated recall after prose reading (Kulhavy & Swenson, 1975; Rasco, Tennyson & Boutwell, 1975). Similar results were found for high school students and adults (Steingart & Glock, 1979; Anderson & Kulhavy, 1972). The Levin (1973) study with below average readers indicates that imagery study is effective with students who have average or better vocabulary skills.

Conflicting results are also found as to the type and extent of imagery training needed for students to profit from the use of mental imagery in reading connected discourse. A four week training program (Lesgold, McCormick & Golincoff, 1975) was successful in helping third and fourth-grade students recall more information; however, similar results were found with third graders after a 20 minute visual imagery program (Pressley, 1976). Other researchers (Kulhavy & Swenson, 1975; Rasco, Tennyson & Boutwell, 1975) also found brief imagery instructions were sufficient to increase the reading comprehension of fourth through sixth grade average or above average readers. Levin (1973) found that below average fourth grade readers with average vocabulary scores benefitted from short imagery instructions while those with low vocabulary scores did not. In another case, brief imagery instruction did not improve the memory of fourth graders (Levin & Divine-Hawkins, 1974).

The results of reported research using brief imagery instruction were inconsistent; whereas, the reports using imagery training were successful. In view of these results it appears that imagery training may be an important factor in assisting some readers to comprehend more effectively. Particularly, below average readers may profit from this instruction.

The purpose of this study was to determine if a group of students learned, recalled, and answered correctly significantly more comprehension items when they were trained to "image" or make up pictures in their heads, than a group that was just instructed to remember the material "for later," but received no special training. Inherent in this study was the question of whether students learned pairs best when presented as pictures, concrete nouns, abstract nouns, or verbs.

### Method

#### Measures

A paired-associate test adapted from Epstein, Rock, and Zuckerman (1960) was given to serve as an indication of the method by which students learned best — pictures, concrete nouns, abstract nouns, verbs. Comprehension pretest and posttest scores were acquired through the administration of the Iowa Tests of Basic Skills (Form 5, Level 10). These tests were administered to both groups under similar conditions and by the same administrator.

#### Subjects

The subjects of this study were 38 fourth year students who attended school in a rural, lower-middle income area in Georgia. The experimental group was comprised of 18 below average students who received 30 minutes of mental imagery exercises per day for a 9 week period. The comparison group was comprised of 20 average and below average students who spent 30 minutes per day with the same experimental materials but in the development of skills other than imagery. Both groups received this instruction from the lead reading teacher.

#### Treatment

After pretesting, two poems from a fourth grade supplementary reading book were presented to both groups, at different times, by the teacher. The poems, "Green Moth" by Winifred Welles and "Crows" by David McCord, were especially conducive to the development of sensory and mental images by the experimental group.

An opaque projector was used to project the poems onto a screen creating a focal point for the students' attention and allowing them to read along silently as the teacher read aloud. In each case, the students in the experimental group were encouraged to linger over the images created by the poet. Questions were used to spur group discussion.

In order to further facilitate those students in the experimental group in imaging what they read, descriptive paragraphs and corresponding pictures were cut out of various supplementary reading books on the fourth grade level. These paragraphs were glued onto poster-board and placed in a small box. Each student then picked a paragraph at random, read and imaged the passage, and drew and colored what came to mind. Finally, the matching pictures were shown to the students for the purpose of noting similarities or differences in detail of the illustrators' renderings and their own.

In addition, the experimental group was encouraged to image those selections in their basal reading textbooks and studybooks that were suitable for this purpose, and the SRA Reading Laboratories also proved useful for special training and imaging of paragraphs read and answering comprehension questions.

As previously noted, the materials used with the comparison group were basically the same. The same poems were also presented to this group by means of the opaque

projector, but literary form, rhyming pattern, and personification were discussed instead of mental imaging.

The comparison group was taught comprehension skills only as they occurred in the context of their normal reading instruction.

### Analysis

Four null hypotheses were constructed which proposed no significant difference between the experimental and comparison groups on the four methods of presentation of the paired-associate test. The fifth null hypothesis proposed no significant difference in comprehension gain between the two groups. The hypotheses were tested at the .05 level.

Data for this study were obtained through the administration of the paired-associate test which was given only once, at the onset of the study, to determine the method by which the group learned best. Comprehension pretest and posttest scores were acquired through the administration of the Iowa Tests of Basic Skills (Form 5, Level 10).

A series of four t-tests were calculated to test the hypotheses for each of the four paired-associate tasks. The results of the t-test (Table 1) revealed that the experimental group scored significantly higher (.001) than the comparison group on the subtest in which pictures were presented as the stimulus. The t-values comparing the means of the subtests presenting concrete nouns, abstract nouns and verbs as stimuli indicated no significant difference.

Table 1

#### RESULTS OF t-TESTS FOR THE PAIRED-ASSOCIATE TASKS

GROUP	VAR.	n	X	SD	t	df
A	PICTURES	18	4.28	1.90	3.82	36*
B		20	2.40	1.05		
A	C. NOUNS	18	2.61	2.06	.70	36
B		20	3.10	2.20		
A	A. NOUNS	18	1.11	1.18	.29	36
B		20	1.00	1.17		
A	VERBS	18	1.00	1.19	.13	36
B		20	.95	1.15		

\*P < .05

The comprehension subtests of the Iowa Tests of Basic Skills (Form 5, Level 10) was administered as pretest and posttest. The gain score was calculated and used as the dependent variable. Since it was necessary to use intact, homogenous groups, ANCOVA was employed to statistically control the groups with the comprehension pretest score as the covariate. The F ratio of 9.27 (Table 2) indicated a significant difference at the .005 level. The adjusted mean gain score of the experimental group (.41) was significantly higher than that of the control group (-.27).

Table 2

**ANALYSIS OF COVARIANCE WITH  
COMPREHENSION GAIN AS THE DEPENDENT  
VARIABLE AND COMPREHENSION PRETEST AS  
COVARIATE**

Source of Variation	SS	df	MS	F
Covariate CPre	1.07	1	1.07	3.49
Main Effect Group	2.83	1	2.83	9.27
Residual	10.70	35	.31	....
Total	14.60	37	.39	....

\* $P < .05$

### Conclusion

The experimental group receiving imagery training increased comprehension scores significantly more than the control group which did not receive imagery training. These results support the trend found the Levin (1973) study that below average students profit from imagery training. The positive findings and the results of Lesgold, McCormick, and Golineoff (1975) lend credence to the possibility that duration of the training is an important variable. The results point to need of additional research and to the possibility that rather simple but extended imagery training can assist the below average reader toward better comprehension.

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## **REPEATED READING OF TAPED LITERATURE: DOES IT MAKE A DIFFERENCE?**

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Learning to read is an ominous task for culturally different students who may enter school with little preparation for understanding printed language. Their own language patterns bear little resemblance to the language of school and even less resemblance to the formal, concise language of print. Their exposure to books and their experience backgrounds are sharply limited. Their homes are characterized by an absence of printed material, and they have been denied one of the most valuable preparatory experiences for reading—that of having been read to. The challenge of understanding the relationship of language and print maybe quite beyond the capacity of some of these children.

Instructional programs for culturally different children, who often comprise a large proportion of remedial programs, do focus on language development in the early primary grades, along with a heavy emphasis on decoding skills. As language and decoding skills develop, ample practice in the use of these skills is essential if they are to become a solid foundation for fluent silent reading. Unfortunately, little time is available in remedial programs for the act of reading itself, which would provide the much-needed practice.

If we consider reading comprehension to be dependent on general language comprehension (Perfetti & Goldman 1976), then, we must concentrate our efforts in remedial programs on techniques which will not only enhance language development, but at the same time foster an understanding of the relationship between language and print.

### **REVIEW**

As a remedial technique for culturally different students, listening while reading serves as a basis for integrating language with print. The Neurological Impress Method (Heckleman 1969), which involves simultaneous reading by the student and teacher, and Assisted Reading (Hoskisson 1975), in which the child is read to after which he repeats back words, phrases, and sentences, are techniques which focus on the relationship between reading and language.

The two methods have provided a foundation for a number of remedial techniques which have been developed and successfully utilized during the last decade. Of particular benefit to culturally different students is the use of taped stories. This technique of taping not only offers exposure to literature and practice in the use of the skills, but it also compensates for time limitations.

The critical role of this multisensory technique for remedial students can be more clearly understood by examining the reading process. A series of visual, auditory, and cognitive skills and processes are required for the utilization of information during the act of reading. Fluency in reading is arrived at through the proper meshing of these skills and processes, which is precipitated by adequate practice in using them.

The stages of information processing are described by LaBerge and Samuels (1974) as related to their theory of automaticity and the acquisition of skills. Visual information is transformed through a series of processing stages involving the visual, phonological, and episodic memory systems until it is finally comprehended in the semantic system. The two criteria for evaluating the processing are *accuracy*, and *automaticity*. Accuracy is demonstrated through word recognition, phrasing, observation of punctuation, and absence of hesitations, repetitions, and omissions. Accuracy requires attention, thus, of necessity, it precedes automaticity.

When attention is no longer required for the processes of decoding from the visual to the semantic systems, automaticity has been achieved. In other words, reading is occurring automatically.

The importance of automaticity is emphasized by LaBerge and Samuels (1974).

It is this capability of automatic processing which we consider critical for the successful operation of multicomponent, complex skills such as reading. As visual words are processed through many stages en route to meaningfulness, each stage is processed automatically. In addition, the transitions from stage to stage must be automatic as well. Sometimes a stage may begin processing before an earlier one finishes its processing (p. 295).

Further enlightenment on the importance of automaticity has evolved from Farnham-Diggory and Gregg's investigation of short-term memory function in young readers. In good readers, memory scanning in both the auditory and visual modalities occurred at about the same speed, while in poor readers, the auditory scanning lagged behind the visual speed. This lack of synchronization is devastating to the reading process. Obviously, automaticity could not occur due to the asynchrony of the two modalities.

Attention to the act of decoding creates a barrier to comprehension until automaticity is reached. Repeated readings aid in overcoming this barrier by providing the practice that is needed for the word recognition skills to become automatic. This promotes the main purpose of repeated readings, which is building fluency (Samuels, 1979).

Several recent studies support the contention that repeated readings and reading while listening do aid in developing reading fluency. All of the studies involved the use of taped material which the students read along with as they listened.

In a four-year study using reading while listening, Schneeberg (1977) found the technique to be beneficial for educationally disadvantaged students. The students demonstrated gains of 1.0 to 1.2 while expected gains were 0.65 to 0.75.

Carbo (1978) also used the technique successfully with learning disabled students. The gain scores ranged from four months to fifteen months after a treatment period of only three months. The requirement of the use of the visual, aural, and tactile senses were cited as an advantage of the method.

Third grade students who were unable to apply their decoding skills to the printed page participated in a study conducted by Chomsky (1976) during which repeated readings of taped literature were utilized. The students "memorized" their stories using this method, which also had a positive effect on reading achievement scores.

Significant comprehension gains resulted from a thirteen week experimental study (Laffey, Kelly, & Perry, 1979) during which Title I students read aloud as they listened repeatedly to taped literature. This study differed from the previous ones in that the students had read along silently in the earlier studies.

Reading while listening provides a means of bridging the gap between the decoding and comprehension levels while providing practice in the use of the skills. Active participation on the part of students is required, yet it allows reading to be an enjoyable activity for students who may have experienced endless frustration during reading previously.

All of the researchers in the four studies mentioned observed significant changes in the students' attitudes toward reading. In addition, it was felt that the materials were highly motivational. Many of the students were experiencing reading success for the first time, which appeared to result in the development of self-confidence and enthusiasm for reading. Since negative attitudes, lack of confidence, and lack of enthusiasm are significant problems with poor readers, these changes were welcome.

The time limitations in remedial programs which deny practice in the use of the skills are compounded by prevalent attitudes and current practice regarding oral reading. It is not widely recognized as a vehicle to comprehension among educators, and is usually sharply curtailed in most school programs. (Durkin, 1978).

The importance of oral reading to comprehension was demonstrated by the Laffey et al study as well as recent results obtained by Negin and Rios (1980). In exploring the effects of oral and silent reading on the comprehension of disabled secondary readers, they found that comprehension scores were superior when either difficult or easy material was read orally than when the same material was read silently.

The study described in this paper was conducted to determine the effect of a year-long treatment program of repeated readings of taped literature on reading achievement of culturally different children. This is essentially a replication of the 13 week study (Laffey, *et al*) over a longer time period. The major difference between this study and the original was that it was considered desirable to compare the growth of students' reading achievement with benefit of the treatment to their growth for a comparable period without the treatment.

Essentially, they served as their own control group for this purpose. Their growth from one year without the treatment was compared to that of the following year, during which they received the treatment. The treatment this year, as well as other instructional activities, were part of the Title I reading program designed to supplement the basal program.

It was hypothesized that there were no statistically significant differences between the experimental and control groups on their (1) comprehension, and (2) total reading test scores when each is taken separately.

## PROCEDURES

### Subjects

Nine students from the 5th and 6th grades from a rural school in Rockingham County, Virginia, served as the subjects. They are characterized by low socio-economic status and language deficiencies, and could be described as culturally different. All were reading from 1½ to 2½ years below grade level, and were most decidedly reluctant readers.

The students were chosen for the study because, as a group, they experienced more difficulty with reading and the least

growth on achievement test scores of any of the Title I students. Their scores showed poor comprehension gains and general weaknesses in phonics and structural analysis.

In addition, their independent oral reading was characterized by the use of poor expression, an inability to apply decoding skills in context, a failure to observe punctuation, and problems with speed. In most cases, the students exhibited auditory sequential memory items on the *Slosson Intelligence Test*, which incidentally placed the majority of the students in the slow learner range.

### Analysis

The *California Achievement Test* was used as the pre- and post-test measure of comprehension and total reading. The experimental treatment consisted of listening while reading to the tapes, both silently and aloud, and this was supplemented with various comprehension activities.

Analysis of the data was carried out using correlated *t* tests. An alpha of .05 was selected for testing statistical significance.

### Treatment

The treatment consisted of reading silently and orally while listening to taped literature along with a number of comprehension activities. The stories used in the study reflected a variety of topics: humor, folk tales, sports stories, biographies, fairy tales, legends, and adventure stories. They were chosen according to two criteria. Appropriate and appealing literature was selected for the purpose of enriching the students' backgrounds. In addition, they were chosen to reflect the expressed and observed interests of the students.

The stories ranged in reading level from 2nd to 5th grade. For the initiation of the treatment period, material which was below the students' instructional level was used. This served a dual purpose. Many of the students were unable to read even relatively easy material with expression so it did present a challenge. It was felt that this material would allow for ease in decoding and maximize the importance of expression. In addition, the researchers wanted the initial experiences with the technique to be success-oriented.

The stories were taped by the researcher with whom the students were not familiar. This was due to the fact that the students heard the teacher's voice on a daily basis for routine procedures, so it was decided that an unfamiliar voice would be preferable.

A carefully prepared orientation program preceded the treatment. The students were given an explanation of the reasons for keeping their place as they read—seeing and hearing the words simultaneously. This was followed by a discussion of the reasons for using a marker. Finally, a demonstration of use of the read along material was presented.

The students spent 10 minutes a day listening to the taped stories. After listening twice, they were encouraged to read aloud with the tape as they listened. This was repeated 2 to 6 times until they could read the story fluently. Eight of the 9 students demonstrated the need to use a marker for the reading.

After the students felt that they had mastered a story, they were given the option of reading it to the teacher, the group, their classroom reading group, or another class in the school. Several read often to younger classes in the school. These same students rarely read aloud willingly to anyone prior to the treatment.

The materials used to supplement the taped stories included oral discussions, re-telling of the stories, oral comparisons

with different versions of the stories, written questions, sequences, descriptions, and creative writing. These activities served as a means of promoting and evaluating comprehension, as well as creating an interaction between the printed materials and language.

### RESULTS

Data analysis using a correlated *t* test revealed the following:  $t(8) = 3.00$ ;  $p < .05$ . Thus the hypothesis of no significant differences for the comprehension achievement gain scores was rejected.

There was also a significant difference for the total test gain scores:  $t(8) = 2.92$ ;  $p < .05$ . Thus, the hypothesis of no significant differences for total test gain scores was also rejected.

### DISCUSSION

These results, along with the earlier results reported in the literature review, seems to clearly indicate that oral reading, which is promoted by repeated readings of taped literature, plays a far more significant role in silent reading success than was formerly thought. Not only did the students in this study make significant achievement gains in comprehension, but many of the students demonstrated a noticeable increase in phonics and structural analysis scores which were reflected in the total reading test scores.

Also, it should be noted that for students with perceptual problems, the listen and read technique is particularly advantageous in that it utilizes a multisensory approach. The benefits from the use of the tape recorder are widely recognized for students with auditory problems. Visual perception difficulties are also aided by the simultaneous auditory reinforcement as the visual image is received.

In addition, many students with reading deficiencies exhibit eye movement problems, such as pursuit, focusing, or saccadic movement, resulting in finger pointing, which inhibits fluency. The listen and read technique provides an opportunity for training children to use markers in a controlled situation.

Possibly one of the most important dimensions of the study related to the affective changes that were noticed throughout the study. In fact, anecdotal records which were kept illustrate dramatic changes in the student's attitudes toward reading. For instance, many students spent additional time in the reading room during their free time and they requested more time so that they could listen more often. Several shy children demonstrated a welcome development of self-confidence in their reading ability and read regularly to different classes in the school. Many students started to volunteer to read orally in their classrooms which they had been reluctant to do previously. Enthusiasm for the materials was expressed in many ways. Near the end of the year, all of the students participated in a program of reading drama, which was prepared for using repeated readings, and in some cases taped materials. For several, it was the first stage production they had been willing to perform in. The positive response of the student body, along with the students' pleasure from their performances, has spurred them to take the initiative for planning a more elaborate production for this year.

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training to facilitate comprehension. The question arises though, what about those disabled readers who have not yet learned to benefit from contextual cues and for whom decoding skills are a necessary first step to contextual awareness?

This present study investigated the feasibility of enhancing literal and inferential comprehension in disabled sixth graders through single-word decoding training before the readers encountered the words in context. The study was carried out under the following circumstances: (1) atypical sixth grade readers (poor and very poor readers); (2) single-word decoding training without a meaning emphasis; (3) complete identification and pronunciation mastery of all the words the pupils read (both passages and questions); (4) measurement of literal and inferential comprehension through multiple choice, four distractor questions; (5) four, one to one (proctor and pupil) experimental sessions.

The major research questions were: (1) Will single-word decoding training leading to pronunciation mastery of words about to be read both in a passage and the accompanying comprehension questions, facilitate poor and very poor sixth grade readers' ability to answer literal and inferential comprehension questions about the passage? (2) Can a single-word decoding procedure that does not teach word meanings but instead brings about the correct pronunciation of words in isolation, be an effective instructional tool in facilitating or enhancing literal and inferential reading comprehension? The premise underlying the last question is that oral language can be an instructional link to print (Brown, 1958; Durkin, 1966, 1970; Mackworth, 1972). Over a decade ago, in a seminal investigation, Wiener and Cromer (1967) postulated a theoretical framework for empirically testing both research questions:

Comprehension which refers to the addition of some form of meaning associated with identification . . . can occur and be examined at any point at which identification can occur, once the visual forms are transformed to auditory forms, there is a possibility of comprehension given the presence of appropriate language skills. (p. 638)

## THE ROLE OF SINGLE-WORD DECODING SKILL ON LITERAL AND INFERENTIAL CONTEXTUAL COMPREHENSION PERFORMANCE

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The effects of single-word decoding practice on reading comprehension of poor readers has been studied in the classroom and laboratory by educational theorists, researchers and practitioners with equivocal results. Some (Otterman, 1955; Jackson & Disney, 1963; Goodman, 1965; Tuinman & Brady, 1973; Duncan, 1974; D'abre, 1977; Hughes, 1977; Kowal, 1977; Allington, 1978; Fleisher, Jenkins & Pany, 1979) argue that with most readers, decoding training does little to guarantee any appreciable improvement in reading comprehension.

Others (Langer, 1965; Bleyer, 1970; Sherk & Liebert, 1978; Blanchard, 1980) maintain that certain forms of single-word decoding instruction with most readers can facilitate reading comprehension. Singer, Samuels, and Spiroff (1974) and Ehri and Wilce (1980) seem to support this point. Ehri et al. (1980) suggests that cost-benefit considerations exist, both for introducing words in isolation and in context. Each offers unique advantages and disadvantages. Singer et al. (1974) seems to corroborate and finds that the best instructional practice is to provide both words in isolation and context

## METHOD

### Subjects

Ninety sixth grade pupils were randomly selected from a population of approximately 120 sixth grade disabled readers. The readers' total reading achievement grade placement levels on the California Achievement Tests (CAT) were at least 1.5 years behind chronological grade placement. The Peabody Picture Vocabulary Test (PPVT) was administered as a covariate. All readers were ranked by IQ scores and then randomly divided into three groups by alternation: control, non-content-specific (NCS), content-specific (CS). The top 15 readers in each group of 30 were designated poor readers and the bottom 15, very poor readers.

The mean PPVT IQ scores and CAT grade placement data for the poor reader groups were: 84 and 4.1 (control), 83 and 4.2 (NCS), and 4 and 4.2 (CS). For the very poor reader groups, the scores and data were: 68 and 2.6 (control), 70 and 2.9 (NCS) and 71 and 2.6 (CS).

### Decoding Training

For the purposes of this study, single-word decoding training involved a proctor pronunciation and pupil echo procedure. CS pupils were asked to identify flash cards (1½" x 2½", primary type) representing words from the passage and questions they were about to read. If they correctly



identified a word by pronouncing it within two seconds, the next flash card was presented. If the pupil did not pronounce a word correctly within two seconds, the proctor pronounced the word and asked the pupil to echo that pronunciation. The word was presented later, but never without some intervening single word instruction or rehearsal. If necessary, the word was presented several times. It should be emphasized that neither of the three groups received contextual help for a word in the form of a definition or an example of its usage in sentence or phrase context.

NCS pupils were asked to identify flash card words from passages equal to those of the CS group in readability (fifth grade) (Fry, 1968) and structure (third person narrative prose, approximately 120 words in length) but never a part of the passages and questions they read as the comprehension criteria.

Control pupils received no training, they were merely given the passages (one at a time) to read and asked to answer the questions as best they could.

### Comprehension Criteria

All pupils in the study read four passages from the *McCall-Crabbs Standard Test Lessons in Reading, Booklet A*. For each of the 4 passages there were 10 author-designed or adapted four-choice questions. Four questions measured inferential comprehension and 6 literal comprehension according to the following definitions: *Literal comprehension*—any question with the purpose of eliciting from the pupil a response which can be found explicitly stated in the written material, *Inferential comprehension*—any question with the purpose of eliciting from the pupil a response which is not explicitly stated in the written material. Pupils answered 24 literal and 16 inferential questions for the study. Test-retest reliability coefficients for the four sets of passages and questions averaged .65 and content validity was determined by a validation panel of reading specialists and two pilot studies.

### Procedure

CS pupils, each day for four days, were presented on a one-to-one basis, a deck of flash cards by a trained parent-volunteer proctor. The passages (which included the appropriate questions and flash card deck) were randomly assigned to the pupils daily. Each flash card deck represented *all* the words the pupils were about to read. There was a flash card deck for each passage and its questions. The average number of flash cards in each deck was 81. Each card in a deck was presented for two seconds. If the word was identified and pronounced correctly, the next card was presented. If not, the proctor pronounced the word and the pupil echoed it. Pupils had to correctly identify and pronounce *all* words regardless of the number of presentations. To control for uniqueness of presentation on the unrecognized words, the minimum number of flash card words presented in a deck was 10. For example, if a pupil was unable to identify or pronounce 5 words on the first presentation of a flash card deck, on the next presentation the 5 words would be presented again but "shuffled" in with 5 known words and randomly presented. The pupils then read the passage and answered the comprehension questions (without the passage present).

NCS pupils followed the same procedures except the flash card words presented each day *never* appeared on any of the four passages and accompanying questions they read. In addition, since CS pupils could identify and pronounce all the words they might encounter, NCS as well as control pupils were allowed to ask the proctors to pronounce any word they

had a question about, to hopefully reduce biasing the results in favor of the CS pupils. Each of the flash decks contained 81 words and the sources of the words in each deck were other *McCall-Crabbs Standard Test Lessons in Reading, Booklet A* passages and questions of fifth grade readability, which included words not present in the passages and questions the NCS pupils read for the study.

### Statistical Analysis

Three, 2 X 3 (ANCOVA) factorial analyses of covariance (PPVT-covariate) were used. The dependent measure in one ANCOVA was the number of literal comprehension questions answered correctly, another used the number of inferential comprehension questions answered correctly, and a third used the total number of comprehension questions answered correctly. Independent variables for the designs were group membership (control, NCS, CS) and level of reading achievement on the CAT (poor and very poor). Computations were accomplished using The Statistical Package for the Social Sciences (Nie, 1975) system of computer programs. The specific programs were analysis of variance and covariance, sub-program ANOVA, and default option.

## RESULTS

### Literal Comprehension

According to the data, reading achievement level and group membership did not have a statistically significant effect on the number of literal comprehension questions answered correctly, nor was the interaction statistically significant.

### Inferential Comprehension

The data for inferential comprehension performance was somewhat different than that of literal comprehension performance. The main effects of reading achievement level  $F(1,83) = 7.62, p = .007$  and group membership  $F(2,83) = 4.01, p = .021$ , each had a statistically significant effect on inferential comprehension performance. A moderate to small effect of size (Cohen, 1969) was found for both independent variables:  $\eta^2$  of .29 and .30 for level and group, respectively. The interaction was not statistically significant. Approximately 8% of the variability in inferential comprehension performance can be explained as attributed to each of the independent variables. In addition, Duncan's New Multiple Range Test (Edwards, 1972) was used to determine the means between which significant differences existed on the group membership variable. It was found that the CS group significantly ( $p < .05$ ) out-performed both its counterparts. They ( $\bar{x} = 15.72$ ) differed significantly from the control ( $\bar{x} = 13.95$ ) and NCS ( $\bar{x} = 12.25$ ) readers. The test results also revealed that the NCS group differed significantly from the control readers.

### Total Comprehension

Only the main effect of reading achievement level had a statistically significant effect on total reading comprehension performance:  $F(1,83) = 6.30, p = .014$ . A moderate to small effect of size was found,  $\eta^2 = .26$ . As was the case with inferential comprehension performance, approximately 8% of the variability in total reading comprehension performance can be explained as due to achievement level of the readers. The group membership X reading achievement level interaction was statistically significant ( $p = .03$ ). Reading achievement level and group membership interacted in an

ordinal manner to affect total reading comprehension performance. Approximately 8% of the variance in total comprehension achievement can be accounted for by knowing simultaneously a reader's reading achievement level and group membership. The Duncan's Test ( $p < .05$ ) was used to determine whether the total comprehension performance mean differences under the two levels of reading achievement differed from each other for the three groups in the study. It was found that the CS and NCS groups did not differ significantly from the other groups but that the control groups differed significantly from the other groups. It is also important to note that the very poor readers in the CS ( $\bar{x} = 20.60$ ) and NCS ( $\bar{x} = 17.95$ ) groups out-performed their control ( $\bar{x} = 16.10$ ) counterparts; but, such was not the case with the poor readers. Control group poor readers ( $\bar{x} = 24.25$ ) answered more comprehension questions correctly than did both the CS ( $\bar{x} = 22.67$ ) and NCS ( $\bar{x} = 19.87$ ) groups of poor readers.

## DISCUSSION

The present study sought to determine if literal and inferential comprehension performance in sixth grade disabled readers could be enhanced by a procedure which ensured single-word decoding mastery of all the words to be read. It appears that literal comprehension amongst poor readers cannot be enhanced to any great degree but just the reverse is true with very poor readers. As a matter of fact, there was an increase in literal comprehension performance of approximately 12% in very poor readers. This represents approximately three more comprehension questions answered correctly by the CS group as opposed to the control group. Unfortunately, the inability of the procedure to change literal comprehension performance when it came to poor readers probably outweighed the gains made by the very poor readers when total reading comprehension data was analyzed. What is unexpected about literal comprehension data—is why the loss of the main effect for reading achievement? Did the CS very poor readers benefit from the procedure to point that their literal comprehension performance basically equalled that of the poor readers—despite the inherent differences in reading achievement levels? The answer seems to be yes. Interestingly enough, the NCS very poor readers ( $\bar{x} = 12.07$ ) seem to have profited from decoding training which was not even content specific when compared to the control group ( $\bar{x} = 10.80$ ).

Turning to a discussion of inferential comprehension performance, the same pattern established with literal comprehension, exists. Poor readers did not benefit; very poor readers did. The main effect for reading achievement level returned from its absence on literal comprehension performance. Poor readers ( $\bar{x} = 7.97$ ) out-performed very poor readers ( $\bar{x} = 6.01$ ). While this might signal that higher order comprehension processes are not quite so amenable to change through a decoding procedure; this is probably only true for poor readers since CS very poor readers did answer correctly approximately twelve percent more inferential comprehension questions than the control group. This represents approximately two more comprehension questions answered correctly. Thus, instructionally it can be anticipated that very poor readers will probably increase their inferential comprehension more through the study's procedures than poor readers.

The findings concerning total reading comprehension performance, as an amalgamation of literal and inferential comprehension, indicates that the main effect for reading achievement level is statistically significant. Despite the earlier

concern over a lack of literal comprehension main effect; the inferential comprehension main effect was powerful enough to cause a significant overall comprehension main effect. This is to be expected since the variable itself (reading achievement level) served as a grouping criterion for the readers in the study. There was no main effect for group membership; but, the group membership X reading achievement level interaction was statistically significant. According to the interaction, control poor readers out-performed NCS and CS readers. It thus seems that for total comprehension performance in poor readers the procedure not only did *not* enhance or facilitate comprehension performance it might even *hinder* it. On the other hand, for those readers who have reading achievement grade placement levels at least a year and one-half below the reading difficulty of the materials to be read (i.e., very poor readers in the study) the procedure seems to help literal and inferential comprehension performance. This seems the case for several reasons: (1) lack of a main effect for reading achievement levels on literal comprehension performance; (2) mean differences between control and CS very poor readers on literal comprehension performance; (3) a significant main effect for group membership on inferential comprehension; (4) mean differences between control and CS very poor readers on inferential comprehension; and (5) a significant interaction on total reading comprehension showing the CS very poor readers significantly out-performing control very poor readers.

In conclusion, it seems possible to experimentally enhance improved literal and inferential comprehension in very poor readers using only their oral and listening language backgrounds as "starting points." Since the study's single-word decoding training avoided a meaning emphasis it would seem that when very poor readers can correctly identify and pronounce a word familiar to their oral and listening language backgrounds they have at least one correct meaning in mind for that word. In addition, it would appear that very poor readers have more potential for improved literal and inferential comprehension than might be expected. In all probability their reading comprehension potential is seriously under-estimated. This would seem the case since a relatively simple decoding procedure improved their reading comprehension. It should be remembered, though, that this simple procedure had two unique characteristics which might have contributed to its success: (1) complete decoding mastery of all words to be read in both the passages and questions, and (2) four individual experimental sessions for each reader.

Notwithstanding the optimism surrounding the procedure with very poor readers, it seems to pay no instructional dividends when it comes to enhancing comprehension in poor readers. Consequently, it seems possible to conclude that single-word decoding training does not enhance comprehension in all categories of disabled readers. This historical dichotomy between those who support and those who do not support the positive effects of single-word decoding training might take a step towards resolution if methodological considerations are given to the differences between the reading achievement levels of the students and the reading difficulty of the materials to be read, complete decoding mastery of both passages and questions and more than one experimental session.

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processing model. According to this model, word identification is possible when the use of context by a reader reduces the number of possibilities for what that word might be.

Klein and Klein (1972) in trying to determine the effect of context utilization on word identification decisions made by readers of different ages, developed a technique which asks students to mark slashes between the words in the context of a passage. Some of the early research in the area of word boundaries provided some evidence of a possible relationship between ability to mark word boundaries and reading performance among very young readers (Mickish, 1974; McNinch, 1974). Other studies (Klein & Klein, 1972; Klein & Klein, 1973; Klein, Klein, & Doris, 1973; Klein, Klein, & Bertino, 1974) indicated that readers of different ages responded differentially to the word boundary-type tasks at the various grade levels and that the ability to use contextual information might be developmental in nature.

Two more recent studies supported earlier findings and offered interesting avenues for further research. Hecker (1978) found evidence that: (1) performance on a word boundary task was associated with grade placement level and level of reading acquisition of students; and that (2) word boundary-type tasks correlated highly with cloze procedure tests, suggesting that they might measure similar traits. Hecker and Jerrolds (1979) found support for the hypothesis that a space test, a special format for a written passage based on word boundaries research (see Figure 1), could serve as an informal measure of reading in much the same way as the cloze procedure functions. Since the space test can be completed within a few minutes, it would offer an alternative to teachers who are usually concerned about the time taken by the various classroom tests. Further, it should be noted that the present researchers and other teachers have noted that some children are resistant to, and others frustrated by, the cloze technique. Apparently these problems arise because the format for the cloze technique is such that those taking the test realize that for many cases there is no possibility beyond the wildest chance that they can get the right word. With the space test there are sufficient data to make it possible to get any or all words right. On the cloze test children are sometimes upset because they cannot tell how well they are doing. The space test provides better opportunities for self-monitoring as the students proceed with the test. Thus, the possibility of using a space test as a measure of reading performance in addition to, or instead of, the cloze test was further explored in the present study.

### THE SPACE TEST AS A POSSIBLE NEW INFORMAL READING PLACEMENT TEST

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Competent readers attempting to gain information from the printed page engage in a "guessing game" in which the material that they have already read and the material that they expect to read facilitates the identification of upcoming words (Goodman, 1976). This contextual characteristic is also an important component of Smith's (1978) information

This study was designed to investigate further the validity of using a space test measure of reading comprehension. Specifically, the purposes of this investigation were: (1) to compare performance of students (at different grade placement levels) on a space test to their performance on a cloze procedure measure; and (2) to suggest acceptable scores for the space test as a placement test.

### METHOD

Seven hundred sixteen 3rd, 4th, 5th, and 6th grade students from a South Carolina rural school were initially involved in this study. The students at each grade level were asked to complete space tests written at their grade placement reading levels and to complete cloze procedures which were made from the same passages.

During an inservice training session held by the researchers, the subjects' teachers were informed of the purposes for the

FIGURE 1

Example of space test format used in this study.

w h i l e s h e t r i e s n o t t o p l  
a y f a v o r i t e s t h e n u r s e s  
c l a i m t h e d o g i n s t i n c t i  
v e l y k n o w s w h e n o n e c h i l  
d i s e x t r e m e l y d e p r e s s e  
d o r s i c k w h e n t h i s o c c u r  
s s h e w i l l s p e n d t h e n i g h  
t a t t h e y o u n g s t e r s b e d s

study and trained in the administration of the tests. Written directions were left with the teachers who then administered the tests. Scoring was done by the researchers.

In order to minimize the possibility of ordering effects, the teachers at each grade level were randomly assigned to a "space first" or "cloze first" testing session. The second testing session took place one week after the first one.

The space tests and cloze procedures were constructed from four stories appearing in the basal reader materials used for instruction in the school where data were collected. Two readability formulas had to place the passages at the designated levels. Fry's (1968) readability graph was used for all four passages. In addition, the Spache readability formula (1958) was also used for the third level passage and the Dale-Chall formula for predicting readability (1948) was used for passages written at the 4th, 5th, and 6th grade levels. The passages from which the tests were made contained approximately 250 words each. The scoring procedure for the space test was the number of words that were correctly set aside by slashes out of the total number of words in the passage. The students were allowed two minutes to complete each level of the space test.

An every fifth word deletion pattern was used on each cloze procedure passage as recommended by Bormuth (1968). This resulted in 47, 45, 46, and 46 deletions for the passages written at the 3rd, 4th, 5th, and 6th grade levels, respectively. The total cloze score per passage was the number of exact words from the original text that were replaced by the student as recommended by Taylor (1953). The cloze procedures were administered under untimed conditions.

At each grade level, the raw cloze procedure scores were correlated with the raw space scores at the same grade level. Regression equations were then used for each grade level to predict a student's raw space score given a raw score on the cloze test that was equal to 38%. This was based on Bormuth's (1967) finding that a student could be instructed in materials in which he received a cloze score of 38%.

Correct raw space and cloze procedure scores were converted to percentages, and means of percent correct scores were calculated for each grade level. Data representing one classroom in grade four and one classroom in grade five were eliminated from the analyses of grades four and five, respectively, due to the large number of students who obtained scores equal to zero on those passages. It was reasoned

that the teachers of these students did not sufficiently explain the task that the students were to perform. The total number of students included in these analyses was 666.

## RESULTS

The results of the regression analyses are presented in Table 1. The correlations between the raw scores on the space and the cloze procedure tests were .63, .73, .63, and .52 for grades 3, 4, 5, and 6, respectively. These correlations were all significant at the .01 level.

The regression equations used to predict the space percent correct score equal to 38% correct in the cloze test yielded scores of 41%, 38%, 43%, and 40% for grades 3, 4, 5, and 6, respectively. As expected by the researchers, the means of percent correct scores on the cloze procedures calculated at each grade level were less than the 38% recommended by Bormuth (1967), indicating that the students in the sample were reading below grade level.

## DISCUSSION

The results of this study support the hypothesis that a space test could, with further validity and reliability research, serve as a measure of reading performance in addition to, or instead of, the cloze test. The correlation values are indicative that the two measures assess similar traits.

From the data presented in this study the authors are currently recommending that a space test score of 40% correct is approximately the same as a score of 38% on the cloze test. The data further suggest that a student is probably reading below his grade placement level if his space test score on a passage written at that grade reading level is below 40%.

It should also be noted that some students in the sample could not complete the cloze passages written at their grade placement levels. However, these same students managed to partially complete the space test even though the corresponding scores were generally low. This conclusion supports observations reported in an earlier study. Hecker and Jerrolds (1979) found that while students seem to enjoy completing the space test, the completion of the cloze procedure was a frustrating experience for many of them.

FIGURE 2

An example of a correct word scoring for a space passage (score = 14).

w h i l e / s h e / t r i e s / n o / t t o / p l  
a y / f a v o r / i t / e s / t h e / n u r s e s /  
c l a i m / t h e / d o g / i n / s t / i n / c t i  
v e l y / k n o w s / w h e n / o n e / c h i l  
d / i s / e x t r e / m e l y / d e / p r e s s / e  
d o r s i c k w h e n t h i s o c c u r  
s s h e w i l l s p e n d t h e n i g h  
t a t t h e y o u n g s t e r s b e d s

TABLE 1

Correlations between Raw Scores on the Cloze and Space Tests, Mean Percents Correct, and Predicted Space Percent Equivalent to 38% on Cloze for Grades 3 through 6

Grade	Number of Students	Correlation Raw Scores on Cloze & Space	Mean Percent Cloze	Mean Percent Space	Space Percent Correct that Equals 38% of Cloze
3	101	.63*	16.09	29.24	40.55
4	219	.73*	26.56	31.95	38.22
5	144	.63*	28.52	37.64	42.51
6	202	.52*	23.47	33.98	40.48
Total	666				

\*Significant at .01 level

While this study adds more insight into the possibility of using a space test as a measure of reading performance, some questions require further investigation. The authors are presently in the process of analyzing the data for order effects, possible interactions, and correlations with other measures of reading achievement. Additional research, however, needs to be done concerning the reliability and validity of the space test with the performance of children from other school settings.

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**REACTION: THE SPACE TEST  
AS AN INFORMAL READING TEST**

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My reaction to the present paper has to perforce be influenced by my current teaching activities. Presently I am a Title I Reading teacher whose students have scored in the area of stanines 1-3 on reading achievement tests and who could be described euphuistically as educationally resistant.

My own in-class experience with the cloze technique as a teaching and test tool has engendered negative responses on the part of my students to the point where they simply will not do it.

After being charged with the responsibility of reacting to the Hecker, Jerrólds, and Benton paper, and out of curiosity, I had a space exercise typed up and run off for use in my resistant classes. I gave it to my classes just to test their reaction to the "new" process. It was considered by the students as fun, sporty, and "do-able."

On the space test contrived for my class, the better readers appeared to score well and the less able readers appeared to score less well. There appeared to be a sufficiently high enough correlation to warrant that further study be made in

this area; particularly in view of the fact that the space test exercise is so palatable and well received by the students.

Perhaps one reason why a space test has an advantage over the traditional cloze test procedure is that all the information is before the student; all he has to do is "fiddle" around with it. Conversely, with the cloze procedure the student has to "pull" information out of his head. For underachievers and resistant students the needed information is not always so readily available as it appears that they often lack the ability to generate or to recall it.

I would recommend the authors push forward in this area of evaluation. It is classroom oriented and eminently worthwhile as it offers a relevant alternative to more traditional evaluation forms.

#### COMPREHENSION AND THE



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**RESPONSE TO  
DR. JAMES DINNAN'S PRESENTATION**

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For those that have attempted, and in most cases have failed, to teach formal grammar to students with reading problems, Dinnan's presentation offers an alternative solution that is very worthwhile.

The formula

$$\frac{C = M - M + R}{E(v)}$$

seems to have more to offer the student as an aid to comprehension than it does as a means to learning the intricacies of formal grammar. Communication/comprehension is related to the written or oral understanding of matter (M) and the relation words (R) of one matter to another matter. One important factor that must be understood with relation words is that they are related to time, space, amount, and quality. Those who have not had the opportunity to be exposed to Dinnan's oral explanation of the interaction of matter and relation words missed an exciting educational experience.

The list of 110 high frequency words and the contrast word for each, researched using other languages, that account for 50% of the language redundancy should be of interest and value to all in the area of reading.

**COMPREHENSION THROUGH  
ORAL LANGUAGE PERCEPTIONS:  
PARADIGMATIC LANGUAGE TRAINING  
FOR HEAD START CHILDREN**

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The development of measures to determine readiness for reading, basic intelligence, and academic achievement have all relied heavily on the utilization of both word frequency counts and word association. Since the work of Thorndike, word frequency tables have been the basis of controlled vocabulary basal reading series. These lists (such as the *Dolch* and *Rimland*) are consulted in terms of developing oral language training for reading readiness; and consequently, are also found on tests of reading and reading readiness. Association tests; such as: completion, matching, analogy, synonym, and antonym mirror both intelligence and reading readiness in that they simulate some of the cognitive processes

of the reading act itself. As an added advantage, word associations do not require reading ability. What they do require, however, is an accounting for how information is processed and for qualitative levels of response.

Dinnan, Cowart, and Bickley (1971) have designed a workable schemata for the classification of responses as either paradigmatic or syntagmatic. The schema is based on the products of intellectual operations posited by Guilford (1967). McNinch, Hornby, and Richmond (1971) have shown that paradigmatic or syntagmatic responses are facets of verbal fluency and abstract problem-solving abilities. Different groups of students reflect highly significant differences on measures involving language or intellectual processes. The results of these studies have shown a high degree of relationship between paradigmatic responses and academic achievement (Bickley, Dinnan & Bickley, 1970; Dinnan, Cowart & Bickley, 1971; Dinnan, 1973; Dinnan, 1971; Crable, 1975; Lamarre, 1976; Cartelli, 1980.) Dinnan (1975) has suggested that a major emphasis in early schooling should be placed on word association and word frequency findings. Using data from research in word frequency, he has identified and compared 110 prime frequency words in five languages. The order of appearance is virtually identical across the five languages. Singularly noteworthy is that these 110 words comprise 50% of all communications in either spoken or written forms (Dinnan & Lodge, 1976.) Furthermore, the common element appearing in the 110 prime frequencies is that of base references to time, space, and amount.

### Purpose

It was the purpose of this investigation to explore the main effects of paradigmatic language training on (three groups) childrens' comprehension of oral language perceptions and performance scores on educational subtests in the areas of gross motor, fine motor, concepts, and communication. The following null hypotheses were formulated and evaluated for statistical significance at the .01 level:

H<sub>01</sub>. Treatment time will not effect differences between Group (0, 1, 2) means of childrens' comprehension of oral language perceptions.

H<sub>02</sub>. Treatment time will not effect differences between Group (0, 1, 2) means of childrens' performance scores on educational subtest tasks.

H<sub>03</sub>. There will be no significant, positive correlation between paradigmatic language training and each criterion variable.

### Subjects

The subjects in this study consisted of five classes (N=83) of preschool children enrolled in a full-time, local Head Start Program. Classes were randomly divided into three groups for experimental purposes. *Group 0* consisted of two classes of children (N=35, X age=4.1) who received no (0 minutes per day) special language training; *Group 1* consisted of one class of children (N=16, X age=4.0) who received one, 20-30 minute special training session each day; *Group 2* consisted of two classes of children (N=32, X age=4.1) who received two sessions (20-30 minutes each) of special language training per day.

### Procedures

All children in this study were given pretests on the two criterion measures that would be used in the final analysis of the data. The *Paradigmatic/Syntagmatic Oral Language Inventory (P/S Inventory)*; Dinnan, 1971, Form A) and the *Developmental Indicators for the Assessment of Learning (DIAL)*; Mardell & Goldenberg, 1975, Subtests: Gross Motor, Fine Motor, Concepts, and Communication). Pretest data were subjected to a One Way ANOVA for each criterion variable. Each subtest of the DIAL is an independent evaluation and, therefore, was treated as a separate criterion. Results indicate that at the .01 level of confidence, the only statistically significant *F* ratio was for the Gross Motor Subtest ( $F=.0145$ ). All other comparisons were not significant, and the Groups (except in the area of Gross Motor) were initially equal prior to training.

### Training

Teachers and aides in *Groups 1* and *2* were given one week of intensive, preservice on the implementation and methodology of paradigmatic language training. Training in paradigmatic language structures, as the oral language curriculum, was initiated approximately one month later after new children had settled down and adjusted to being in school and pretest data had been collected.

The training program was based on the sequential and structured lessons presented in the *Key to Learning Series, Kit 1* (Dinnan & Cowart, 1976). Training in comprehension of oral language perceptions focused on getting children to process information through relations and then group the products into classes and major systems. The prime frequency words (110 frequency) were presented (orally) in contrast sets to establish this awareness. These relational referents lend themselves to demonstration and can easily be taught through the use of varied objects, pictures, etc., found in any classroom. The object of oral language training was to bring the children to the point where they could automatically contrast responses as found in the general language community. Children were also taught the basic referent pairs (25) which are considered minimal before entry into reading could be initiated. Special language training was conducted daily through the entire school year (approximately 8 months). Posttesting on criterion measures was conducted for all *Groups* during the month of April of the same school year.

### Results and Findings

Since the results of pretest findings showed some degree of significance (Training X Gross Motor), a Pearson Product-Moment Correlation was run between the independent and dependent variables (Training X each criterion measure) to determine the degree of relationship that existed. The results are as follows: *Training X a) P/S Inventory*,  $r=.7277$ ,  $p<.001$ ; *b) DIAL Gross Motor*,  $r=.1786$ ,  $p=.053$ ; *c) DIAL Fine Motor*,  $r=.3330$ ,  $p=.001$ ; *d) DIAL Concepts*,  $r=.3718$ ,  $p=.001$ ; *3) Communication*,  $r=.3288$ ,  $p<.001$ . These findings indicate that a high, positive relationship exists between paradigmatic language training and performance scores on the *P/S Inventory* and moderate (but statistically significant) relationship exists with all other criterion measures. In light of these findings, an Analysis of Covariance (ANCOVA) was the statistical instrument used to analyze the posttest data. Pretests were used as the covariate (control variable) so as not to confound the real differences in Group means after treatment. Scheffe aftertests were also

used in the comparison of Group means to determine more precisely which difference between means contributed to the significance.

Table 1 shows a summary of the posttest results of the effects of treatment in relation to each criterion variable. An overview of this Table supports the following findings in relation to each null hypothesis.

Treatment time will not effect differences between Group (0, 1, 2) means of childrens' comprehension of oral language perceptions was the first hypothesis. Table 1 shows that treatment was significantly related to childrens' comprehension of oral language perceptions. Children who received paradigmatic language training in Groups 1 and 2, performed significantly better on the *P/S Inventory* than those children who received 0 minutes of training. Sixty-seven percent of the variance in paradigmatic language responding can be accounted for by knowing to which Group (0, 1, or 2) children were assigned. Therefore, the null hypothesis is rejected.

Table 1

ANCOVA For The Main Effects of Training By Performance Scores On Criterion Measures						
Criterion	SS	df	(Between)			
			MS	F	eta	Variance
P/S Inventory	3197.875	2	1598.937	54.018*	.82	67%
DIAL Gross Motor	31.850	2	15.925	10.089*	.54	29%
DIAL Fine Motor	70.995	2	35.497	17.263*	.63	40%
DIAL Concepts	82.533	2	41.267	22.743*	.68	46%
DIAL Communication	87.987	2	43.993	23.344*	.69	48%

p .001

Treatment time will not effect differences between Group (0, 1, 2) means of childrens' performance scores on educational subtest tasks was the second hypothesis. Table 1 shows that treatment time was significantly related to childrens' performance scores on each of the four subtests of the *DIAL*. Children who received some special training, (both Groups 1 or 2) performed significantly better on educational subtests than those who received no training (Group 0). Anywhere from 30% to 48% of the variance in educational subtest scores can be accounted for by knowing to which treatment group children were assigned. The null hypothesis is therefore rejected.

There will be no significant, positive correlation between paradigmatic language training and each criterion variable, was the third hypothesis. As mentioned above, the findings derived from a Pearson Product-Moment Correlation did reveal that training was significantly related to each criterion variable. The associations are moderately to highly significant and are all positive. Apparently, paradigmatic language training is a reliable predictor of childrens' performance on educational measurements.

Although all analyses of the data reveal significant differences between Group means, it was not known what Group differences were contributing to the significance; therefore, Scheffe Multiple Range Aftertests were used to analyze Group (0, 1, 2) means. The differences in treatment time were significantly different from group means for the *P/S Inventory*. Comparisons show that Group 2 (who received two daily sessions) performed significantly better ( $p < .001$ ) than Group 1 (who received one daily session). Also, Group 1 performed significantly better than Group 0, who received no

special training. These results are not surprising in light of the findings of the ANCOVA and Pearson Correlation. When comparisons were made for differences between Group means on the performance scores of the *DIAL* subtests, significant Group differences were obtained ( $p < .01$ ) between Group 2 and Group 0 for each subtest variable. Apparently, the *quantity* of treatment time was a key factor in obtaining significant differences in Group mean performance. The more paradigmatic language training children received, the greater the difference between means.

### Discussion

The primary goal of a good oral language program is to transmit to children the necessary prerequisite skills necessary for reading readiness. As Shipman (1972) discovered in his analysis of longitudinal data for 18,000 Head Start children, *comprehension* of language does not seem to be the obstacle, it is the *use* of language for communication and performance

purposes that these children failed to make gains. Perhaps, this is one reason why despite the increased attention and funding to provide quality, education programs for Head Start children, they may still fail to make substantial academic gains to succeed in school. The content of the language program must be very carefully analyzed in relation to priority objectives and skills children must have to be even mildly competitive in school.

This study suggests that paradigmatic language training *can* provide children at the preschool level with a sound oral language foundation on which to build reading skills. There is substantial, significant research that supports the paradigmatic/syntagmatic criterion for the classification of associative responses and the desirability of using verbal associations as predictors of reading performance. Despite earlier research (Entwistle, 1966) which showed that children did not make the paradigmatic/syntagmatic shift until they were of school age, we are finding out that children before the age of five or six can readily be taught to operate in a paradigmatic framework before they get to school. Educators can no longer assume that children will *use* language to express common relationships and communicate ideas. Intervention must take place now when we can make a real difference and guide children through the mastery of the oral language code. Only then can we be sure that we have given our preschoolers a real Head Start!

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Such nodes are considered to be made up of a network of related pieces of information described by labels or words. These words or labels are related to the node label or *superset* (Collins & Quillian).

For example, the superset (label/word) *canary* has properties (or pieces of information) such as *is yellow* and *can sing* (Collins & Quillian). The word used to label the node (superset) together with its constituent properties (also labeled by words) is thought to make up a concept. Semantic memory, then, is assumed to consist of a series of inter-related nodes. That is, individual nodes would be related through various relational elements to other nodes (Collins & Loftus). As described by Pearson and Johnson (1978) a network of inter-related nodes make up a semantic map for a given entity.

A priming of a given node and related linkages occurs when a stimulus word activates all its semantically-related node and related linkages, including those to other nodes. Therefore "... priming a node such as *red* will prime the links involving the relation 'color' throughout the network" (Collins & Loftus, p. 409). Priming a network would be analogous to the excitation of an electrical circuit: The "power is on" and ready for utilization. For example, a subject's response time will be less to pronounce word sets like *bank, school, church, store* than will be the amount of time required to retrieve semantically-unrelated words such as *seven, may, over, school*. The time required to make a response is affected by the semantic context (Meyer & Schvaneveldt, 1970). Such a model is testable. If valid, then information ought to be retrieved more effectively—either in greater or more selective quantity and/or more quickly.

Semantically and randomly aired words, categorized word lists for free recall and for word pronunciation tasks, and sets of sentences requiring lexical decisions have been used to test priming and network theories (Collins & Quillian, 1969; Bower, Clark, Lesgold & Winzenz, 1969; Meyer & Schvaneveldt, 1971, 1976; Forbach, Stanners & Hochhaus, 1974; Neely, 1977; Cohene, Smith & Klein, 1978; Shuart, 1979). However, studies of the priming/spreading activation model tend to have used young adults as test subjects. But these studies do give general support to the spreading activation thesis.

How information is stored and retrieved is integral to accessing meaning. And, of course, accessing meaning is central to reading comprehension. If semantic loading—or priming—does decrease response time in free recall or pronunciation tasks for young adults, would younger subjects (i.e., elementary school children) respond in like manner? If so, then techniques for teaching reading may be aided accordingly, especially for remedial reading instruction. Therefore, the question posed by this study is: What effects will semantic loading have on the word-pronunciation ability of disabled fifth-grade readers?

## METHOD

### Subjects

The subjects were 23 fifth-grade pupils drawn from a suburban school district in southern Mississippi. Subjects were drawn randomly from the total population of disabled fifth-grade readers in the co-operating school. Poor readers were selected for the study to avoid automaticity (LaBerge & Samuels) of response in the pronunciation task. In addition it was thought that disabled readers' performance would yield a scatter of pronunciation errors to analyze.

The mean total grade-level equivalence as measured on the comprehensive Test of Basic Skills (CTBS) was 4.3. Scores

## WORD READING EFFICIENCY OF DISABLED READERS UNDER CONDITIONS OF SEMANTIC LOADING WITH IMPLICATIONS FOR READING COMPREHENSION

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In 1962 Quillian proposed a "spreading activation" theory originally intended for computer simulation but which has since been used to attempt explanation of storage and retrieval of familiar semantic information (Collins & Loftus). This theory posits development and storage of concept nodes.

obtained from giving the *Peabody Picture Vocabulary Test* yielded a mean of 87. The subjects were assigned to one of three groups, based upon vocabulary and comprehension subtest scores from the CTBS. The three groups consisted of (1) subjects whose vocabulary scores were superior to their comprehension scores, (2) subjects whose comprehension scores were superior to their vocabulary scores, and (3) subjects whose vocabulary scores were equal to their comprehension subtest scores.

### Pronunciation Lists

The Harris-Jacobson Word List, the Spache Revised Word List, and the Dolch Basic Sight Vocabulary of 220 Words were used to create a pronunciation list of 160 words. The words were grouped into 40 sets of 4 words per set. Of these 40 sets, 11 were developed from the Harris-Jacobson list, 14 were from the Dolch list, and 14 were from the Spache list.

The four-word sets were made up of semantically-grouped words, with the semantic relationship implied by the grouping. For example, *car, truck, wagon, cart* made up a set of lexical words; *by, into, around, upon* illustrate a structure-word set.

The same 160 words were used to generate seven lists of 40 sets of 4 semantically-unrelated words (e.g., *meat, girl, supper, in*; and *where, do, ask, three*). No attempt was made to maintain either structural or lexical word categories. The seven lists of semantically unrelated word sets were developed to reduce list affect.

### Pronunciation Task

Each subject read two word lists; one with semantically-related word sets and one list with semantically-unrelated sets. A one-week interval separated the two readings. Lists were randomly assigned such that 12 of the subjects read the categorized list at the first session. The remaining pupils read the semantically-unrelated (random) word list. Those who read the categorized list at the first session then read the random list at the second session; those reading a random list first, read the categorized list the second session.

For each reading, the subjects were handed the appropriate list and were simply requested to read the words. A stopwatch was used to time the task. Subjects were also tape recorded as they read.

### Design and Analysis

Analysis of variance was used to treat data drawn by repeated measures, using three groups (vocabulary comprehension; comprehension vocabulary; vocabulary = comprehension) and two lists (categorized and random) via an ANOVAR program (Veldman). The first analysis compared the time (in seconds) required for oral reading of each of the two lists. The other three analyses involved a comparison of (1) total pronunciation errors, (2) lexical pronunciation errors, and (3) structural pronunciation errors.

### Results

The facets of priming associated with retrieval or storage of lexical and structural words were investigated by analyzing the total time required for the subjects to read each list and by analyzing the number and type of word-reading errors. Four analyses were employed to investigate priming effects. No significant differences were found within the ANOVAR model for time in seconds (T-Sec) as the dependent measure. Nor was there a significant difference between groups (vocabulary, comprehension, neutral) on the T-Sec variable

for pronouncing the categorized vs. randomized lists.

Of the remaining analyses (total pronunciation errors, lexical pronunciation errors, and structural pronunciation errors) computed between groups (vocabulary, comprehension, neutral) there were no significant differences. That is, there were no differences among these three groups in reading the words on the categorized list as compared to their performance on the randomized list.

However, two of the lists comparisons were significant: total errors [ $F(1, 22) = 11.56$ ;  $p = .003$ ] and lexical errors [ $F(1, 22) = 29.72$ ;  $p = .00001$ ]. In each of these comparisons, the subjects read the categorized list with fewer word-calling errors than were made when they read the same words on the randomized list. The third comparison used the number of errors on structural words across the two lists. There were no significant differences. The subjects read the categorized structure words about as well ( $X = 2.39$ ) as they did the randomized structure words [ $X = 2.17$ ;  $F(1, 22) = .219$ ].

### Summary, Conclusions, Recommendations

Blocking of words into semantically related categories did not reduce time in seconds required for pronunciation. That is, there was no significant time difference for pronouncing the 160 categorized words as compared to the pronunciation of these words in a randomized arrangement. In the studies previously cited (Collins & Quillian, 1969; Bower, et al., 1969; Meyer (Schvaneveldt, 1971, 1976; Forbach, et al., 1974; Neely, 1977; Cohene, et al., 1978; Shuart, 1979) categorization via semantic loading seemed to improve task performance with time as the variable.

However, pronunciation of words on the categorized list did result in significantly fewer word-calling errors ( $p = .003$ ) than was found on the random list. The investigation of list effects showed that errors in pronouncing categorized lexical words were significantly fewer ( $p = .00001$ ) than randomized words.

Blocking of lexical words into semantically-related sets does appear to facilitate word calling or pronunciation since random assignment of these same words into nonprimed sets appears to result in a greater number of errors in word calling. To this extent the spreading activation model is supported in this study.

Pronunciation of structure words seems not to be facilitated by arranging these words into semantically-related sets. The number of word-calling errors on these words across the lists did not differ significantly. It may be that these words are not stored in memory the same way as are lexical words. Had the structure words been presented as separate lists (categorized and randomized) other analyses could have been made by using time to pronounce and frequency and type of word-calling errors as the criterion measures. Such a procedure may have provided the information upon which to build a stronger inference regarding the storage and retrieval of structure words.

Not having reached significance for the structure-word error rate may be due to the subjects' poor verbal fluency and the abstractness of structure words. According to the PPVT scores, the subjects tended to be at the low end of the average range, indicating some ineptness in verbal fluency. The relationship among the words in each structure-word set was only implied. The combination of the abstractness of these words and the poor verbal skills of the subjects may have caused the subjects not to note the implied relationship of the words. Therefore, there would be no priming effects for either time to pronounce or for reducing word-calling errors.

A significant time differential across the lists may not have been obtained because of the readers' familiarity with the words. LaBerge and Samuels (1976) held that, "If . . . the stimulus processing does not require attention (i.e., it is automatic), then the response latency will not include stimulus processing time" (p. 550). However, the fewer pronunciation errors on the lexical categorized words do suggest attention to meaning in some way. Because of confounding variables, it is difficult to provide more than very tentative guesses.

One conclusion does appear to be valid. Teaching strategies for poor readers should include attention to establishing meaning referents in terms of supersets and properties. In addition to developing understandings of word structure as a processing/recognition skill, attention should also be given to priming attributes. To assist learner concept development, teachers would do well to present property labels (words) in a hierarchical manner, thus showing relationship among the words and thereby enhancing the learners' concept formation. Doing so would support the oft-stated, "We more nearly bring meaning to what we read rather than to derive meaning from what we read." Pearson and Johnson (1978) make use of such an approach/teaching technique and bringing meaning to the reading task as a foundation point to build upon in developing skills in reading.

Additional research is needed. If lexical words were separated from the structural words, each type of words could be analyzed in primed and in random arrangements. Perhaps using words not so familiar to the subjects would yield a primed effect through a difference in time required to read the categorized vs. randomized word lists. Finally, increasing the number of words per set and, for the structure words, stating the semantic relationship for each set might result in significant pronunciation differentials for time and/or errors. If this were to happen it would be an indication that lexical and structural words are similarly stored and retrieved. Recording the word-calling mistakes for analyses and for comparison with the correct words should also offer insight into long-term memory storage. Additional investigation of the spreading activation theory using elementary school subjects appears to be warranted.

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**A STUDY IN THE EFFECTS OF  
PARADIGMATIC LANGUAGE TRAINING AND  
ITS TRANSFER TO THE READING AND WRITING  
PERFORMANCE OF ADULT ILLITERATES**

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The purpose of this study was to investigate the effects of special training in paradigmatic language structures on the paradigmatic language responses, the reading performance, and the writing performance of adult illiterates. The study attempted to answer three questions: 1. What are the effects of special training in paradigmatic language structures on the paradigmatic language responses of adult illiterates? 2. What are the transfer effects of special training in paradigmatic language structures on the reading performance and writing performance of adult illiterates? 3. How will time affect the gains shown after treatment?

A review of the literature on word association indicated that most of the research had been conducted by psychologists and linguists (Esper, 1973; Nelson, 1977). The studies reflect an interest in the analysis of association responses as they reflect language and thought. It was found that the responses of children were different from those of adults (Brown & Berko, 1960; Entwisle, 1966; Palermo & Jenkins, 1966). Children responded with phrases which included the stimulus word in a syntactic structure. Adults responded with words that could serve as replacements and were of the same form class as the stimulus word. The terms syntagmatic and paradigmatic evolved as classifications for these types of responses and were validated by Beauvois (1973).

Researchers have investigated responses to determine whether or not a relationship exists between the patterns of an individual's word association responding and reading. A strong relationship was found to exist between paradigmatic language responding and reading (Bickley, Bickley, & Cowart, 1971; Brosier, 1974). Researchers attempted to determine what the effects of special training in paradigmatic language structures were on the reading achievement of learning-disabled and normal children (Cartelli, 1976; Dinnan, Sullivan, & Cartelli, 1979). As yet studies have been conducted with atypical adults, such as adult illiterates in a prison setting.

Although attempts have been made to establish literacy programs in prisons, none have shown any consistent and permanent impact on the system. There are many reasons for the failures of programs for the illiterate inmate, including insufficient materials, inadequate instruction, and lack of instructional time.

The sample in this study consisted of 10 volunteer male inmates of a minimum-security prison in northeast Georgia. Only inmates who read at less than the 5.0 grade level were included in this study.

All subjects in this study were pretested using the *Oral Paradigmatic/Syntagmatic Language Inventory* (Dinnan, 1971) and the *Woodcock Reading Mastery Tests*, Forms A and B (Woodcock, 1973) subtests: letter identification, word identification, word comprehension, and passage comprehension. The subjects were asked to write on a specific topic; their writings were analyzed using a type-token ratio (Carroll, 1964; Fox, 1972).

Training in paradigmatic language structures was implemented immediately after the pretest data were collected. Training took place at the correctional institution for 1½ hours every Tuesday and Thursday evening from January 29, 1980, to May 8, 1980. Approximately 45 hours were spent on training. The instructional program was based on *Basic Learning Technology* (Ulmer, Dinnan, & Moore, 1978), which was developed for the Georgia State Department of Education.

The first posttesting was conducted immediately following the completion of the special training program. The Oral P/S and the Woodcock were administered to all subjects at this time. Subjects were again asked to write on a specific topic. Residual testing, following the same procedures, was conducted five weeks after instruction was completed. Alternate forms of the Woodcock and different writing topics were used for each test period.

A repeated-measures analysis of variance was the statistical design used to analyze the effects of time on the gains made at the end of the special training and five weeks after special training was completed. A series of Dunn *t* tests were calculated to further analyze the data. The .05 level of significance was designated for rejecting the null hypotheses.

It was found that there were significant differences between the repeated-measures scores of paradigmatic language responses, reading performance, and writing performance. As there was no control group (the inmates composing the group were parolled before the data could be collected), the effects of special treatment, which were significant on all three variables, may have been produced by other factors. Therefore, only the effects of time will be included here.

There was a significant difference in the subjects' paradigmatic responses on the pretest, posttest, and residual test ( $F(2,18)=5.47; p<.05$ ). Time of testing does affect paradigmatic responses.

A series of Dunn *t* tests was calculated to compare the mean scores for each time of testing. It was found ( $p<.05$ ) that there was a significant mean score difference between the pretest ( $\bar{x}_1=19.1$ ) and posttest ( $\bar{x}_2=26.5$ ). It was further found ( $p<.05$ ) that there was a significant difference between the pretest ( $\bar{x}_1=19.1$ ) and residual test ( $\bar{x}_3=27.2$ ). There was no significant difference found between the posttest ( $\bar{x}_2=26.5$ ) and residual test ( $\bar{x}_3=27.2$ ). The results indicate that gains made in paradigmatic language responding do not dissipate over time.

There was a significant difference in the subjects' reading performance on the pretest, posttest, and residual test ( $F(2,18)=27.11; p<.001$ ). Time does affect writing performance.

A series of Dunn *t* tests was calculated to compare the mean scores for each time of testing. It was found ( $p<.01$ ) that there was a significant mean score difference between the pretest ( $\bar{x}_1=449.2$ ) and the residual test ( $\bar{x}_3=481.8$ ). It was further found ( $p<.05$ ) that there was a significant mean score difference between the posttest ( $\bar{x}_2=462.8$ ) and the residual test ( $\bar{x}_3=481.8$ ). There was no significant difference found between the pretest ( $\bar{x}_1=449.2$ ) and the posttest ( $\bar{x}_2=462.8$ ). The results indicate that the gains made in reading performance continued to increase after instruction was completed. Gains did not dissipate over time.

There was a significant difference in the subjects' performance on the pre-test, posttest, and residual test ( $F(2,18)=5.47; p<.05$ ). Time of testing does affect performance.

A series of Dunn *t* tests was calculated to compare the mean scores for each time of testing. It was found ( $p<.01$ ) that there was a significant mean score difference between the pretest ( $\bar{x}_1=.87$ ) and posttest ( $\bar{x}_2=.73$ ). It was further found ( $p<.01$ ) that there was a significant difference between the pretest ( $\bar{x}_1=.87$ ) and residual test ( $\bar{x}_3=.65$ ). There was no significant difference between the posttest ( $\bar{x}_2=.73$ ) and residual test ( $\bar{x}_3=.65$ ). The results indicate that gains in writing performance do not dissipate over time after special training was completed.

## Conclusions

The results of this study indicate that paradigmatic structures can be taught to atypical adults in an institutional setting. Inspection of the mean scores indicated that once the paradigmatic language framework was established, it did not dissipate over time. This reinforces Cartelli's (1976) findings on the effects of paradigmatic language training.

Another major observation of this study was that reading performance mean scores showed an increase at the end of the special training program. Additional mean score growth was noted on the residual testing. It is likely that the transfer effects of the special training are responsible for the growth.

Gains shown at the end of instruction did not dissipate over time for any of the variables. It appears that once the paradigmatic framework has been established, it becomes an active part of the cognitive processing of the subjects. When the oral readiness aspect of the training has been affected, training progresses to applying the same principles of contrasts and classifications to reading and writing. Subjects learn to transfer the use of paradigmatic language structures to other areas. Once the subject has learned to think paradigmatically, he becomes part of the general speech community and is able to deal with instruction in the expected language. Learning takes place and continues to develop even after formal instruction is completed.

Writing performance of the atypical adults showed significant improvement within the confines of the report. This study did not attempt to remediate the structural and grammatical skills of the subjects. The emphasis was placed on the content of the writing, ideas, and whether or not the ideas were successfully communicated. Part of the training included discussion centering on four basic themes: 1. Man in relation to man; 2. Man in relation to himself; 3. Man in relation to nature; and 4. Man in relation to the supernatural. Subjects were asked to discuss and write about their relationship to nature, society, and so forth. The output, in terms of the numbers of words that they wrote, increased considerably.

Positive conclusions can be made about the effectiveness of this program for an adult prison population. In terms of the improvement in literacy, the program appeared successful

since there were significant gains made on all the dependent variables. In addition, informal conclusions can be made about the effectiveness of this program on the behaviors of the inmates. Observations of behaviors were made and certain changes were noted during the course of the instruction. The subjects became more verbal from the first class session to the last. All of them participated in the class activities and exhibited a positive attitude about the class and each other.

The subjects appeared to gain self-confidence about their ability to learn and to use language. They wrote more letters to friends and family. They discussed among each other during the day ideas which had been presented in class the night before. They wanted to learn more and felt that they could do so.

By the end of the program, some of the subjects were asking about literacy programs that they could participate in when they were released from prison. Some were getting information about jobs that they would like in the future. They were trying to find ways to make places for themselves in the outside world. These actions all indicate the effectiveness of the program.

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## REACTION: ALTERNATIVE READING INSTRUCTION FOR PRISON ILLITERATES

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The research reported in "A study in the effects of paradigmatic language training and its transfer to the reading and writing performance of adult illiterates": 1) employs a specific and unique set of materials and teaching strategies; 2) focuses on a segment of adult illiterates selected from inmates in a minimum-security prison; and 3) assesses the effect of instruction on the subjects in terms of time periods allotted to teaching, testing, and retesting.

According to the review of the literature in the report, the failure of many prison educational programs may be attributed to inadequacies in materials, instruction, and time.

The study uses 1) the paradigmatic/syntagmatic language test; 2) the paradigmatic language structures in teaching strategies and materials; and 3) the time lapse in testing and retesting periods. These are apparent efforts to investigate alternatives to the problems previously cited as causative factors in unsuccessful attempts to teach adult illiterate prisoners and problems in the valid and reliable measurement of those attempts.

### Reaction

Testing and teaching procedures which contribute to efficient and recognizable gains in reading and writing skill and which motivate the student to practice reading and writing activities are beneficial at any level of instruction. However, such outcomes are vital to the success of instruction with adult illiterates. Consequently, the conclusions drawn in the report are of practical as well as theoretical importance.

The loss of the control group from this design forced the researcher to make some cautious interpretations of the statistical results of scores of paradigmatic language responses and reading and writing performance and to focus more attention than originally designed on the "effects of time." However, the use of informal and unobtrusive observations made by the researcher are used to support and in some instances extend statistical results.

Subjective interpretation of the results of an investigation is often considered a weakness in research. In this study, it indicates the humane attitude of an individual researcher and teacher working in what is sometimes the inhumane circumstance of the prison environment.

However, evidence of such an attitude, in conjunction with the findings of the study, does emphasize some of the unanswered questions, limitations of the paper, and the need for replication of the study.

It is also true that the constraints of a brief paper prohibit the extended yet needed explanation of such complex components as the testing and teaching strategies used in paradigmatic language structures. The bibliography for a paper such as this one then becomes an important reference and, indeed, a source of expansion. It would have been helpful to have a reference to the more extensive publication upon which this paper was based.

This study includes some limitations which are the results of the uniqueness of the subjects' circumstances and would be difficult to overcome. The untimely (for the researcher) parole of the control group proved that the subjects were not nearly so "captive an audience" as might have been anticipated. The small number of all male subjects representing

a restricted geographic region severely limits the generalizability of the results. The dual role of researcher and instructor presents possible problems of interpretative bias but also provides opportunities for unobtrusive observation which would, otherwise, be lost to the researcher. It is such subjective observations in combination with more quantifiable results which suggest future investigations of paradigmatic language structures in prison educational programs involving: 1) larger numbers of subjects; 2) more varied subjects representing broader geographic regions, sex categories, ethnic origins; 3) more stable control group and/or alternative instruction groups; 4) varied and quantifiable assessments of subjects' writing samples; 5) pre- and post-instruction measures of attitude (concerning reading, writing, additional instruction, self-concept); 6) case study techniques; 7) longitudinal research designs; 8) evaluation of influence of student exchanges, with discussions related to instruction but taking place outside instructional periods.

The results of the study contribute new possibilities for instructional materials and teaching strategies in penal institutions. The need for replication as well as expanded research is implicit. Hopefully, the base of investigation which this study establishes will be extended.

# AN INVESTIGATION OF VARIABLES THAT PREDICT GAIN SCORES IN TITLE I READING PROGRAMS IN PENNSYLVANIA

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Historically, reading instruction has played an important and accepted role in the curriculum of the elementary school. Knowledge of how to read is essential for one to function and to contribute to society. Student growth in reading skills is the single most important goal of the reading program (Farr, 1969).

Eliminating illiteracy is of national concern. The Economic Opportunity Act became effective in 1964 as part of President Johnson's "War on Poverty." In 1965 the United States Congress passed the Elementary and Secondary Act (Fromboluti, 1979). This act initiated Federal aid to education on a broad scale. Title I of this act provided funds to improve elementary and secondary school programs for educationally deprived children in low-income areas. Early evaluative studies of the effectiveness of Title I were inconclusive partly due to infancy and diffuseness of the program (not focused on basic skills and not serving the most needy students) and also due to the lack of adequate evaluative data (Executive Summary, ETS Study, 1976). However, research has continued and in most areas the programs have improved.

Recently, the International Reading Association published a book, *Teaching Reading in Compensatory Classes* (Calfree & Drum, 1979), which provides a relatively complete description of various aspects of compensatory reading instruction. These descriptive data were gathered from a survey of over 500 schools and 1500 teachers. The original study was conducted in 1971 by the Educational Testing Service (ETS) under a contract from the United States Office of Education. This nationwide survey included principals and teachers in all types of schools. The results of the ETS data were analyzed and interpreted by a committee of International Reading Association members at the request of the IRA Board of Directors.

In addition to national surveys regarding the overall effectiveness of the Title I programs, investigations have been conducted on various aspects of Title I Reading programs at the state level. (Brooks, 1975; Kaufman, 1976, 1977; Kean, 1979).

The question frequently asked is what variables are predictors of reading achievement. However, the question is seldom answered with conclusive results. Thousands of teachers with considerable years of teaching experience have testified that no one, simple, magical solution is available. A review of the literature suggested that the following variables contributed to success in reading: (1) socio-economic status of the school and community; (2) student attitude; (3) teacher competence and experience; (4) school organization; (5) per pupil expenditure; (6) amount of instruction time; and (7) instructional approaches and materials used by teachers.

The question is continually raised as to the effectiveness of federal efforts in compensatory education. The answer to this is still undetermined. Rand (1978) reported that numerous surveys have attempted to resolve the question, with generally mixed and uncertain results. It seems obvious that educators and researchers need to collaborate to further study what factors promote the most successful development in terms of growth and achievement in reading.

Because some school districts in Pennsylvania appear to be more successful than others in terms of reading achievement, the purpose of the study was to identify which of the following variables were associated with significant growth in reading achievement as determined by Normal Curve Equivalent (NCE) gain scores. The variables considered were as follows: (1) percentage of boys in the program; (2) length of program as measured in terms of weeks; (3) classification of the residence area; (4) per pupil expenditure; (5) number of aides utilized per teacher; (6) years of teaching experience as a reading specialist; (7) pupil-reading specialist ratio; and (8) number of specialists for the fourth grade.

The population for this study consisted of 50 school districts in Pennsylvania who utilized the 1965 Gates MacGinitie Reading Test and had student populations over 150 in the public schools. Using a table of random numbers, every eighth district involved in a Title I Program with a student population over 150 was chosen until the study had 50 districts.

The data collected were from the 1978-79 annual reports submitted to the Title I Office in Harrisburg, Pennsylvania, computed statistical reports from the Bureau of Research and Evaluation in Harrisburg, Pennsylvania, and from an information sheet completed by the Title I project directors. The data represented all fourth-grade students participating in public school Title I programs in the selected 50 districts.

Stepwise Multiple Regression Analysis was the statistical technique employed to determine which of the independent variables were the best predictors of the criterion variable.

The results of the study indicated the following:

- (1) School districts with fewer boys showed significant gains in NCE scores at the .05 level.
- (2) School districts involved in the Title I program for a fewer number of weeks showed greater NCE gain scores.
- (3) Metropolitan, other than center city students displayed significant gains over nonmetropolitan community students in achieving higher NCE gain scores.
- (4) Although not significant at the .05 level, per pupil expenditure appeared to contribute to the amount of variance in NCE gain scores.
- (5) School districts employing more aides showed lower NCE gain scores.
- (6) The years of teaching experience as a Reading Specialist did not contribute significantly to higher gain scores.

(7) The larger the number of students per Reading Specialist, the higher the NCE gain score.

(8) The number of specialists utilized appeared to make no difference in the gain scores.

### Discussion

The literature suggests there tends to be more boys than girls in remedial reading classes. Since one cannot eliminate boys from the reading program, the data were computed without the percentage of boys to determine whether there were other variables that would contribute significantly to higher gain scores. An analysis of this statistical data revealed that type of residence area (metropolitan-other than center city, or suburban) contributed significantly to greater gain scores.

The researchers's analysis as to why greater gain scores with fewer weeks in the program appeared to occur was because some districts began the program in September, one month prior to the pretesting. Those districts which started the program after the pretesting tended to show greater gain scores.

There is no conclusive evidence to support why school districts employing more aides showed lower NCE gain scores, but it is theorized that aides were often given "teaching duties" and were only occasionally supervised by the Reading Specialist.

In the future, additional research needs to be conducted in order to foster improved instruction and greater achievement growth in reading. Some areas recommended for further study are: (1) investigate instructional practices in compensatory classes; (2) include attitude as one of the variables; (3) investigate time on task by the students; (4) conduct a replica of this study including more school districts in the state; (5) research the achievement test utilized for evaluation and the curriculum of the schools; and (6) investigate the relationship between student gains in reading and general academic performance.

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**SENTENCE COMPLEXITY AS A FACTOR IN THE  
RELATIVE DIFFICULTY OF THREE PASSAGES  
OF VARYING SYNTACTIC COMPLEXITY**

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The assumption behind most readability formulas, that longer and more complex sentences make a passage more difficult to comprehend, has been challenged by studies of the oral language patterns of children and their relationship to reading comprehension as well as studies indicating that the language maturity of the reader may be an important factor in what he finds difficult to read and understand. Results of studies by Fisher (1934); Strickland (1962); Loban, (1963); Hunt (1965) (1966); and Menyuk (1969) have indicated that the speech of most children includes a wide variety of language patterns, including complex sentences, by the time they enter school. There are also indications that children comprehend most readily materials most similar to their oral language patterns (Strickland, 1962; Lutz, 1974; Ruddell, 1965). In a study in which the relative ease or complexity of sentences conveying the same idea but varying in structure was investigated, Pearson (1974) found that the third-grade and fourth-grade children involved seemed "not only to be able to handle complexity, but actually to prefer it." He reported finding no support for the practice of "simplifying" material by rewriting it with shorter simpler sentences.

Longitudinal studies by Loban (1963; 1968; 1970) have indicated a tendency for children who were most competent in oral language patterns by the age of 5 to be superior in reading and writing as they grew older. He also found that children increased in their language maturity with age. Hunt (1965) found that older students tended to include in a phrase or clause what younger children wrote as separate sentences. He conducted a number of studies involving analysis of writing of children of different ages to find indicators of maturity in writing and concluded that T-unit length tended to increase consistently with age and could be considered a kind of "growth bud" of writing maturity. On the basis of the students' writing which he collected, he developed syntactic complexity scores for various age groups, with mean T-unit length and mean clause length as the syntactic factors indicated (Hunt, 1970).

The relationship of writing maturity to reading comprehension was investigated by Smith (1971) who wrote passages at 4th, 8th, 12th, and Average Adult levels of complexity, using Hunt's standards, and administered them to children of various grade levels. He found that while fourth graders performed best on comprehension checks on the fourth-grade level materials, eleventh graders did the poorest on material written at this level. He also found the reading performance of the older students generally superior on all passages to that of the younger. He concluded that what a student normally produces in his writing influences, and is influenced by, what he is reading. The possibility that improvement in writing maturity may also positively affect comprehension of more difficult materials has been investigated in a number of studies, including those of Hughes



(1975) and Combs (1977) which indicated improvement in comprehension performance for seventh-grade readers following instruction and extensive practice in sentence combining.

Despite these findings relevant to sentence complexity and reading, simplification of materials by reducing sentence length as well as vocabulary load continues to be suggested as a means of making material easier for a poor reader to understand.

Klare (1974), Pearson (1974) and Neuwirth (1980) indicate that the factors which are predictive (sentence and word length, for example) may not necessarily be the factors causing the difficulty, but may be reflecting a wider variety of underlying factors. Therefore, the simplification procedure may be built on a false assumption.

The present study was designed to investigate the effects of sentence complexity on the relative readability of three passages by college students designated as proficient, average, and weak readers. Purposes of the investigation were: (1) to determine whether more complex sentence structure aided or impeded comprehension performance; (2) to determine whether student ratings of the relative difficulty of the passages corresponded with performance indicators; (3) to determine whether comprehension performance and perception of difficulty varied among students identified as proficient, average, or weak readers; and (4) to ascertain the extent to which students of different reading levels perceived the variance in sentence complexity as the element affecting passage difficulty and the extent to which they isolated other factors.

## Subjects

The subjects were 97 college students at a state university, 20 freshmen from special sections of a college developmental English section, and 77 upperclass and graduate students in education enrolled in classes in content area reading.

The Comprehension Section of the Iowa Silent Reading Test, Level III, Form E, 1972, was used as an indicator of reading comprehension proficiency. On the basis of norms designed for students entering four-year colleges and universities, students whose scores fell in stanines 7, 8, and 9 were designated as proficient readers; those with scores in stanines 4, 5, and 6 as average readers; and students with scores in stanines 1, 2, and 3 as weak readers.

## Materials

Three 310-word passages were constructed at 6th, 10th, and Average Adult levels of syntactic complexity using standards for mean T-unit and mean clause length developed by Hunt (1970). All three passages dealt with the subject of protocol and were constructed from three different segments from the same parent source, "Profiles: Good Manners and Common Sense" by Kuhn (1964).

In order to limit the passage variability to the sentence complexity element as much as possible, attempts were made to control the vocabulary variable in the three passages. Number of syllables in each passage were kept as constant as feasible: 6th grade, 491; 10th grade, 504; and 12th, 494. Also, number of difficult words, defined as meanings of words not familiar to 70% or more of children below 6th grade level, as indicated by Edgar Dale's *The Living Vocabulary: A National Vocabulary Inventory*, were kept constant (33 per passage).

The readability levels of these passages, as indicated by the Fry readability formula, were 8th grade for passage one (6th grade sentence complexity level); 9th grade for passage two (10th grade sentence complexity level); and 10th grade for passage three (Average Adult sentence complexity level).

The 10 comprehension questions for each passage were constructed so that 5 were at the literal level and 5 at interpretive. All items were multiple-choice.

A brief rating sheet and questionnaire was devised in order to obtain students' ratings of relative passage difficulty and information concerning the factors they felt contributed.

## Procedures

Students read the 3 passages at one sitting, answering the 10 comprehension questions after each passage. Subjects were allowed to reread portions of the passage if they wished as they answered the questions. The comprehension check was untimed, but all students completed it within one 50-minute period.

Following the administration of the instrument, the rating sheet and brief questionnaire was distributed to students. Subjects for this study were limited to the 78 students who were enrolled in secondary/content area reading classes.

Subjects were asked to rate the three passages as to their relative ease or difficulty for obtaining facts and for gaining overall ideas of the paragraph. They were also asked to explain their ratings. A six-point scale was used to quantify ratings consistently. If a particular passage was considered easiest of the three for understanding both facts and ideas, the point value of 2 was assigned; if, on the other hand, the passage was considered most difficult in both respects, the assigned point value was 6.

Analysis of variance was used to determine whether performance on and rating of difficulty of the three passages differed significantly for the group as a whole, or for subgroups of students categorized as proficient, average, or weak readers.

Student responses as to reasons for rating passage difficulty as they did were grouped according to the syntactic complexity level of the passage designated as most difficult: 6, 10, or Average Adult. Responses for the proficient and average readers were categorized as to whether they related to the syntactic complexity element involved or to other student perceived differences such as variation in style of writing, quality of paragraph organization, or vocabulary.

## RESULTS

### Comprehension Performance

1. Comprehension performance for the total group of 97 students was highest on the passage constructed at Average Adult syntactic complexity level and lowest on the 10th grade passage. Performance differences were significant at the .01 level.
2. For students designated as proficient, average, or weak readers, performance on the Average Adult level passage was highest for all three groups. No significant between-group differences were found.
3. Comparison of the overall comprehension performance of proficient, average, and weak readers indicated significantly higher comprehension performance for proficient than for weak readers on all three passages.

### Rating of Passage Difficulty

1. When overall ratings of passage difficulty were compared for the 77 advanced college students involved in this phase of the study, the Average Adult passage was indicated as the easiest, and the 10th grade passage as most difficult. Differences between the Average Adult and other two levels were significant at the .01 level.
2. When ratings on the three passages were compared for the proficient and average readers which constituted this sample, both groups indicated the Average Adult level passage as easiest. However, the proficient readers tended to consider the 6th grade passage as most difficult while the average readers tended to consider the 10th grade passage most difficult. These between-group differences were not significant, however.

### Student Explanations

Student explanations for their choice of a specific passage as "most difficult" is summarized in Table 1. The number of students indicated at the top of the columns represent the numbers of proficient and average readers designating each passage as "most difficult." Explanations given for each passage by those students who found the passage "most difficult" will be reported separately with explanations relevant to the syntactic complexity element reported first and other reasons, second.

#### *Passage 1 (Sixth Grade Syntactic Complexity Level)*

1. Explanations were predominantly related to the syntactic complexity element for both proficient and average readers; all but one proficient reader offered this type of explanation. Responses considered relevant to this category included direct statements about the relatively short and simple sentences in this passage as well as more indirect statements referring to this passage as "choppy", "disconnected", "fragmented", or "full of unrelated details".
2. Explanations relevant to factors other than the syntactic complexity element related to organization (indications that passage was poorly organized), style (perception of the first passage as narrative and others as more expository) and vocabulary (vocabulary considered more difficult than in other passages). As Table 1 indicates, these explanations were more frequently offered by average than by proficient readers.

#### *Passage Two: 10th Grade Syntactic Complexity Level*

1. Explanations for the difficulty of this passage were less frequently related to sentence complexity than to other factors for both average and proficient readers. Where sentence complexity were cited, it usually was related to this passage having shorter and simpler sentences than passage three, and therefore was found to be "choppy" or "disconnected."
2. The most frequent explanation cited by both proficient and average readers was that this passage was poorly organized and hard to follow in comparison to the others. Those whose comments were relevant to style saw this passage as more factual or technical than the first.

#### *Passage Three: Average Adult Syntactic Complexity Level*

1. Two of the three proficient readers rating this passage as most difficult indicated the increased complexity of the sentences as a factor in the difficulty. This type of explanation was also offered by two of the nine readers involved.
2. Two thirds of the average readers rating this passage as

most difficult felt the passage was more technical than the others, and therefore more difficult to understand. Organization was not cited as a factor by either group of readers, and difficulty of vocabulary by only one in each subgroup.

### DISCUSSION

Since both performance and student perception of reading ease indicated the passage with the most complex sentence structure as easiest, the assumption stemming from readability research that "short and simple equals easy to understand" was not supported. Results would tend rather to support the "chunk model" theoretical position which "claims that comprehension consists of synthesizing atomistic propositions into larger conceptual or semantic units rather than analyzing complex units into atomistic propositions" (Pearson, 1974).

The fact that the 10th grade, rather than the 6th grade syntactic complexity level passage, was considered most difficult somewhat confounds the issue. Student explanations support the possibility that this may have been due to "unplanned" features of the 10th grade passage relating primarily to organization that seemed to cause problems, especially for less proficient readers.

Although significant differences did not exist between average and proficient readers on the three passages, certain tendencies seem worthy of further investigation. The proficient readers, for example, seemed more sensitive to the syntactic complexity element, particularly with reference to the first and third passages. Also, while both groups of readers performed more poorly on the 10th grade passage, the proficient readers considered the 6th grade passage more difficult. Three readers indicated that they felt the questions for the 10th grade passage were more ambiguous than the questions for the other passages. This also raises another issue worthy of further investigation.

The results of the study should be interpreted cautiously due to a number of limitations including: (1) the large difference in the numbers of proficient, weak, and average readers involved in the study which would raise questions about the statistical validity; (2) availability of data concerning perception of difficulty and explanations for advanced education students only, all of whom were classified as average and proficient readers by the Iowa Silent Reading test comprehension section; and (3) the use of three different original passages which, even though from same "parent" source, may have introduced a number of extraneous variables.

Further investigation of the issue in studies with more representative samples of proficient, average, and weak college readers and with more control over "outside variables" would seem warranted. The inclusion of student ratings and explanations was considered valuable in isolating possible factors needing further investigation, and is recommended for subsequent studies.

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Table 1

## Summary of Explanations for Passage Designated as Most Difficult

Response Category	6th Grade S.C.*		10th Grade S.C.*		A.A. S.C.*	
	Proficient Readers	Average Readers	Proficient Readers	Average Readers	Proficient Readers	Average Readers
	(13)	(13)	(12)	(17)	(3)	(9)
Sentence Complexity	12 (92%)	8 (61%)	2 (17%)	7 (41%)	2 (66%)	2 (22%)
Organization	1 (8%)	3 (23%)	5 (42%)	10 (59%)	—	—
Style	—	4 (31%)	4 (33%)	3 (18%)	1 (33%)	6 (67%)
Vocabulary	2 (15%)	3 (23%)	1 (8%)	4 (23%)	1 (33%)	1 (11%)

## \*S.C.—Syntactic Complexity

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## REACTION: SENTENCE COMPLEXITY

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The results of studies by researchers such as Goodman (1967), Strickland (1962), and Ruddell (1976) indicate that children can most easily read sentences which are similar to their own oral language patterns. Children have difficulty reading sentence patterns which differ from their own patterns. An investigation by Smith (1971) indicated that the level at which syntactic structures appear in the writing of students is the best level for reading for that student. Level of syntactic complexity of reading materials does affect reading comprehension.

Fairbanks and Ledesma investigated the effects of sentence complexity on the relative readability of three passages by college students designated as proficient, average, and weak readers. Twenty (20) students were selected from college developmental English, while 77 (78?) were selected from upperclass and graduate students in education. The groups were designated according to stanine scores on the Iowa Silent. There is, however, no report of how many students were weak as opposed to average or proficient readers. Are we correct to assume that all twenty (20) freshmen in developmental English were weak readers, and conversely, that all graduate students were proficient readers? Were these students selected because they represented the best possible sample or because they were "intact" groups and readily available? A statement concerning the skill make-up of the group and selection process would clarify concerns relative to population sample.

Three (3) passages for student consumption were devised from the same source. The researchers went to some degree of trouble to control passage variability by keeping "as constant as feasible" the number of syllables per passage and the number of difficult words. The Fry formula measuring readability was used and indicated levels of 8th grade for passage one, 9th grade for passage two, and 10th grade for passage three. The Fry formula measures the average number of syllables and the average length of sentences. One therefore, must question whether the difficulty of the passages was held constant, and whether sentence complexity (syntax) was the only variable between passages.

The passages were constructed at the 6th, 10th, and Average Adult level of syntactic complexity using standards for mean T-unit and mean clause length. The T-unit has been questioned as a valid means for assessing difficulty of sentence complexity. Schmidt (1978) found that contrary to the research of O'Donnell, Griffin, and Norris (1976) mean T-unit did not measure the complexity of passages when one of two had been manipulated to increase complexity. A simple version of the passage had more words per T-unit (15.64) than did the complex version (13.09). This is supported by the work of Fry and Weber (1978) who found that sentence length was not as important a factor as the amount of embedding found in sentences. It was found that center-embedding increased the complexity of sentences. Research supports the use of formulas which measure the amount of embedding resulting from manipulation of syntax (Schmidt, 1978; Botel and Granowsky, 1972; Jenkins, 1977).

Fairbanks and Ledesma performed an analysis of variance to determine whether performance on and rating of difficulty for the three (3) passages differed significantly for the three (3) groups. The weak readers, however, were not given a questionnaire and were therefore different from the other

groups in this way. Differences between ratings of passage difficulty for average and proficient readers were not significant. If weak readers had been included the data might have yielded different information. Or were they weak enough to have experienced a significantly different perception of passage difficulty?

Average and proficient readers tended to rate as "most difficult" those passages with "choppy", disconnected", "fragmented" sentences. This supports the contention that students use more complex sentences as they mature, and that, students read best what is written at their own level of linguistic competence. (It is interesting to note that all readers, weak included, read all passages competently). Since "disconnected" sentences caused difficulty for the students, it is interesting to this writer that Ledesma rated sentences which appear to be disconnected as one T-unit while more connected sentences were rated as two T-units. The ratings by average length of T-unit may be in error when one considers ease of reading or "readability". Perhaps grammatical complexity is indeed too complex to be measured by length of T-unit. Unusual grammatical structures (ones not appearing frequently in the reader's own expressive language) are more difficult to comprehend than are longer more common-appearing T-units.

It has been found that the development of syntactic complexity occurs up to and perhaps into adulthood (Smith, 1971). It should prove interesting to research the variability of comprehension of passages written above the Average Adult complexity level, especially if college students are to be used as subjects. Passages could be developed with high complexity levels based upon number of and type of embeddings and permutations which result in syntax which is not easily predictable. Surely our college texts (or professional journals) could provide challenging material for passage construction!

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## TEACHERS' ANALYSES OF STRATEGIES EMPLOYED IN MISCOMPREHENSION

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Durkin (1978-79) in a search of the literature was unable to find an adequate definition of comprehension instruction for her classroom observational studies. She does differentiate the asking of questions in the classrooms she observed from instruction for the following reason: "Rarely . . . was anything done with wrong answers except to say that they were wrong" (p. 490). If classroom teachers are able to use "wrong" answers as a diagnostic and/or instructional tool, analysis of students' disabling comprehension strategies is a critical step.

That students use identifiable reading reasoning strategies has been suggested by research with third-grade students verbalizing answers to a silent reading test (Bowling, Noel & Laffey, 1977) and average and above average sixth-grade students as they verbalized while selecting among multiple choice comprehension items (Kavale & Shreiner, 1979). The necessity of relating reading performance to the specific reading task is highlighted by Blaricom & White (1976); they found substantial differences in fifth-grade students' ability to generate acceptable responses to main idea questions and their ability to select a correct response.

Strange (1980) proposes the term *miscomprehension*, from the term *miscue* for *inexact oral responses*, to analyze what students do when responding to stories read. His explanations for miscomprehension are based on a schema theory of comprehension which "seeks to explain how new information acquired while reading is meshed with old information already in our heads" (p. 393).

This study was designed to provide information on classroom teachers' analyses of reading reasoning strategies employed by their students that they characterized as experiencing comprehension difficulties which were unrelated to word recognition difficulties. Researchers disagree on the importance of accurate and rapid word recognition on comprehension (Cromer, 1970; Fleisher, Jenkins, & Pany, 1979; Guthrie, 1973; Kendall & Hood, 1979; Perfetti & Hogaboam, 1975). In the researcher's experience, classroom teachers frequently express perplexity when designing instruction for students evidencing comprehension difficulties but who appear to have adequate word recognition. Also, eliminating word recognition difficulty as an explanation for miscomprehension in the study was thought to foster a greater focus on reasoning strategies.

Students were tested in their own classrooms by their regular reading teacher to provide a non-clinical setting. Working with these students on a continuing basis, reading teachers could readily identify subjects with comprehension difficulties: such students were deemed appropriate candidates for the study.

### The Study

Teachers asked to gather data for the study were graduate students participating in the Right-to-Read consortium classes at Alabama A & M University. Through a handout, teachers were instructed to gather data according to a six step strategy including identification, diagnosis, analysis, transcription, and activities.

Because of the exploratory nature of the research and an interest in the miscomprehension strategies that might be generated by classroom teachers as they analyzed the responses of their own students, the miscomprehension ex-

planations suggested by Strange (1980) were not presented to teachers. However, miscomprehension terminology was used in the directions. Teachers in the study did have a basic familiarity with miscue analysis (Goodman & Burke, 1971, 1971).

The informal reading inventory (IRI) administered was the *Auburn Informal Reading Survey (AIRS)* (Noland, 1974).

Some form of analysis of students' comprehension was provided by 23 of the 26 teachers on 45 students at the following grade levels: Four students in 1st-grade, 7 students in 2nd-grade, 15 students in 3rd-grade, 4 student in 4th-grade, 9 students in 5th-grade, 1 student in each of the 6th, 8th, and 9th grades, and 3 students in the 7th-grade.

Findings in these data suggested the need for further data collection with another IRI. Through the analysis of a large number of responses to questions on the AIRS, certain test questions appeared to be non-discriminating with these students.

Teachers in this second group were graduate students enrolled in the researcher's reading testing course. Two students not actively teaching tested children referred by classroom teachers for comprehension difficulty. As a part of the data collection process for course requirements, this group also administered the *Wisconsin Tests of Reading Skill Development: Comprehension* (Otto, 1977) to these same students. Data were gathered during November, 1980.

The informal reading inventory used by these students was the *Sucher-Allred Reading Placement Inventory* (Sucher & Allred, 1973). At least one question on this instrument was non-discriminating.

Some analysis of comprehension strategies was made by thirteen of the graduate students on 26 children at the following grade levels: 7 students at 2nd-grade, 6 students at 3rd-grade, 7 students at 4th-grade, 4 students at 5th-grade, and 2 students at the 6th-grade.

### Results and Discussion

A great diversity in description was used by teachers to explain miscomprehension, making clearly identifiable categories difficult. Essentially the same words were used by 13 teachers in the first group to identify lack of knowledge of the key vocabulary in the story as a miscomprehension response. Only one teacher in the second group identified this as a strategy. Seven teachers indicated that the child's own experience caused him to miscomprehend while one teacher in the second group clearly described this as a strategy. Teachers in both groups tended to describe the miscomprehension strategies of both children they tested in the same terms, even when differences were noted, such as "misses context clues" for Child 1 and "uses some context clues but missed some" for Child 2. Word recognition difficulties and description of the miscomprehension in terms of the kind of question missed were identifiable. Although described in varying terms, it appeared that many teachers analyzed the child's comprehension strategies relative to individual reader characteristics.

It was decided to test the *usefulness* of these apparent categories and the miscomprehension strategies suggested by Strange as they related to these teachers' miscomprehension explanations.

Independent analyses of teachers' explanatory comments related to these categories were made by the researcher, a university teacher of undergraduate and graduate reading methods courses, and a graduate student clinician teaching undergraduate reading courses. Meetings among the raters sought to resolve any differences of opinion.

After thorough familiarization with the categories, the raters showed marked agreement on the classification of the teacher explanations. Some categories suggested by Strange seemed by the raters to require modification, not only to mesh with teacher categories, but to better describe the responses being made by children. These modifications will be delineated along with discussion of the tabulation of teacher explanations for each category. A strategy identified by an individual teacher was counted only once although, as noted, categories were frequently repeated by individual teachers.

The following five categories were generated from teacher explanations.

A) Word Recognition: The child's comprehension is affected by word recognition difficulties.

That 22 teachers delineated word recognition problems for students supposedly selected because of good word recognition but poor comprehension highlights their difficulty in isolating a *pure* comprehension disability. Teachers also related problems in identifying such students with their testing; their choices were frequently not confirmed by testing, necessitating other choices.

B) Question Type: The strategy employed by the reader is described in terms of the *kind* of question miscomprehended.

The 26 teachers who focused on the kind of question missed used comments such as "missed two getting fact" and "problems with literal comprehension and sequencing." The delineation of question types in both of the instruments used, as well as in the *Wisconsin Test* used by the second group, probably contributed to analyses identifying question types miscomprehended.

C) Non-Specific: The explanation given provides no insight into the reasoning strategies used by the reader.

This category was selected for 26 teacher responses which lacked definitiveness, such as *poor recall* and *does not remember specific parts from story read*.

D) Inhibiting reader characteristics: Personality traits, emotional or cognitive skills such as inferential thinking in non-reading situations explains the miscomprehension. *Somewhat unsure of herself* and *often comes out with strange conclusions* are examples of these 17 categories of analysis.

E) Inhibiting task strategies: The reader's approach to the task interferes with comprehension. Extremely rapid reading, lack of concentration on the reading task, or a view of reading as only calling words are constraints affecting comprehension.

Nineteen teachers cited explanations that appeared to fit here, including *reading too fast* and *omitting known words* and *did not even think about answering rules*.

The following seven categories were suggested by Strange (1980) as explanations for miscomprehension by children when a story is discussed with them.

- 1) No existing schema: This category meshed with many of the *lack of key vocabulary* categories. These fourteen categories included *didn't understand meaning of 'land forms'* and *no experience with spaceship*.
- 2) Naive schema: Other explanations for vocabulary deficiencies given by seven teachers seemed to the raters to fit better here, such as *understood 'suction' to a small degree but could not use meaning to a new situation or reference point*.
- 3) No new information: While no teacher categories fit clearly here, the raters' views were that many of children's miscomprehended responses would fit in

this category if expanded to include *details that did not impact on the main point of the story for the child*. This would include the child's response, for example, of *Sunday* instead of *Saturday* as the day the child in the story was going to the circus.

- 4) Poor story: The raters felt that this category should also include *poor question* with an emphasis on the child responding to the story or question. This would thus include stories which did not interest the reader and questions the reader did not understand. Based on this expansion, eight teachers appeared to identify this category with analyses such as *didn't understand way questions were stated, especially those that were lengthy*. Those questions that almost all children miscomprehended could also be included in this category.
- 5) Many schemata appropriate: This category was selected as appropriate for the seven teachers who made statements such as "maybe this is what excites him" and "drawing from own background."
- 6) Schema intrusion: The raters also thought this category should be modified to be useful, based on the actual responses children gave. When the child answered because of a schema intrusion, a *plausible line of reasoning* was usually in operation. For example, the child's response that hens in the story were "clucking" for food, rather than because the fox was there as told in the story, was found to live on a chicken farm, making her *wrong* response plausible. Only two teachers appeared to use this category with "just used own logic" as an example."
- 7) Textual intrusion: Only three teachers appeared to be applying this category with an added element such as *thinking of previous story*.

### Summary and Conclusions

Difficulty with key vocabulary appeared the most identifiable miscomprehension strategy, from teacher analyses and as raters categorized explanatory comments relative to Strange's categories of miscomprehension. Such a focus is consonant with the schema theory of comprehension: "Schema theory suggests that vocabulary instruction should be given greater emphasis than it currently is" (Strange, p. 394).

Other explanations for miscomprehension suggested by teachers appeared unrelated to the schema theory, with a focus on word recognition, the nature of the question students missed, and a third general category for explanations that lacked definitiveness in explanation. Such categories suggest the need for analyses of miscomprehension that can be clearly linked with appropriate instruction.

A focus on learner characteristics and the learner's perception of reading, if valid, suggests a need for individualization in comprehension instruction.

Other categories for miscomprehension relevant to the schema theory proved less useful although all evidenced some usefulness, according to the raters. Their experience in analyzing reader responses and teacher explanations for miscomprehension suggests this procedure as a valuable activity by which teachers may become more alert to and cognizant of the reasoning strategies their students employ when responding to questions.

The usefulness of all categories combined with the large number of non-definitive explanations made by teachers suggests that teachers be supplied with miscomprehension strategies before they analyze students' responses to

questions. Such a procedure may engender greater specificity as teachers analyze readers' reasoning processes.

An unexpected finding suggested by the study was the necessity of extensive testing when developing informal reading inventory questions that validly assess comprehension. Teachers' ready acceptance of non-discriminating questions suggests the need for a more critical approach by teachers to the questions asked in informal reading inventories and those asked of children in the daily reading lesson. A greater range of acceptance answers in IRI's and basal reader manuals appears needed.

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teachers in the elementary grades have tended to over emphasize the word identification component of the reading process. This focus has produced a predictable outcome. Nationwide, standardized test results have shown an increase in word identification scores, but a decrease in comprehension scores (Karlsen, 1973). Faced with the realization that children can often "decode the words with limited understanding of their meaning," teachers are seeking more effective instructional strategies to improve comprehension.

One such strategy offered by Cunningham (1975) suggests a listening/reading transfer method in which students learn that the types of activities they are able to do after listening to a passage are the same types of activities they are requested to do after reading a passage. To facilitate the transfer of comprehension skills, two parallel lessons are designed by the teacher. In the first, the students listen and respond in specific ways, e.g. determining the main idea, organization of ideas, inferring cause and effect, etc. Immediately following, a similar selection is read and responded to in the same manner. Each lesson includes six steps which are to be performed in order, although the format of the exercises can and should be varied. A sample lesson on stating the main idea of a story (taken from Cunningham) will illustrate this procedure:

(1) Set the purpose for listening. "There are three sentences on the board. All are about things that happen in the story I am about to read to you. As you listen, try to decide which sentence tells the main idea of this story—the most important idea. Try to choose the sentence you would tell someone if they asked you what the story was all about."

(2) Read the selection to the children.

(3) Have the children volunteer choices for main idea; have them explain why that choice seems to tell what the story is mainly about and why the others do not.

(4) Give the children mimeographed sheets with three sentences and a story and tell them to read to determine which of the sentences tells the main idea.

(5) Children read and choose the main idea.

(6) Children share their choices and the explanation for the choices as a whole class or in small groups.

According to Cunningham, three underlying principles are essential for the success of this approach. First, students are asked to do the same thing while reading as they had previously done while listening, and that they realize the similarity of the two processes. Second, the teacher must establish definite purposes for listening and reading. Finally, it is necessary to get the children to verbalize how they arrived at a certain answer. Through such probing and explanation, children who cannot comprehend will be able to observe the inner workings of those who can.

### Purpose

The present study sought to compare the effectiveness of parallel lessons in listening and silent reading to a traditional basal approach to comprehension skills instruction. One hundred and seventy-four fifth graders from 16 randomly selected classrooms in a large midwestern suburban school district participated in the project. Eight classrooms ( $N=91$ ) served as an experimental group while the remaining eight ( $N=83$ ) served as controls. The lowest level reading section of each class (those who can usually decode but cannot understand what they have read) constituted the treatment/non-treatment sample. All students had achieved a minimum of one year below grade level on the reading subtest of the *Iowa Test of Basic Skills*. No significant difference between the experimental and the control groups was found when a two-tailed *t*-test was performed on mean I.Q. scores.

### Procedure

Prior to the initiation of the experiment, a one day in-

## A STUDY OF THE EFFECTS OF LISTENING/READING TRANSFER ON FOUR MEASURES OF READING COMPREHENSION

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During the past two decades, the schools of this country have reacted sharply to the demands of society to "teach more and teach it earlier." In order to accommodate this demand,



service workshop was held for teachers, supervisors, and reading specialist monitors. At that time procedures were explained, techniques defined and practiced, and lessons planned. After the orientation period, all subjects were pre-tested with Form A of the *New Developmental Reading Tests* (Bond-Balow-Hoyt, 1968). This test which evaluates literal and creative comprehension has an alternate form reliability of .89 and an internal consistency reliability of .94. The *t*-tests of group means indicated that no significant differences existed between groups on the four subtests under examination. A 14-week teach/non-teach period was then begun. In lieu of the normal basal instruction, the experimental group received one listening/reading transfer lesson per daily reading session utilizing materials from a supplementary basal series. Control groups received only the traditional basal instruction which adhered to the scope and sequence of the teacher's manual. The time devoted to reading instruction within the framework of a language arts block was equivalent for both groups. Although the experimental teachers followed the six steps of the listening/reading transfer method and emphasized the underlying principles, the activities in the lesson plans were individually conceived and independently constructed. During the 70 teaching sessions equal time was allotted to the comprehension abilities of recognizing the main idea, recalling stated details, recalling sequence of events, sensing relationships among ideas, recognizing cause/effect relationships, inferring main idea, predicting conclusions and outcomes, understanding the implications of stated ideas, understanding characterization, and sensing the tone of the selection. At the conclusion of the training period, all students were post-tested using Form B of the *N.D.R.T.* Reading supervisors spent four to six hours weekly observing classroom proceedings to ensure that guidelines were being followed.

### Materials

Subtests II, III, IV, and V of Forms A and B of the *New Developmental Reading Tests for the Intermediate Grades* (4, 5, 6) were used for pre- and posttest measures. The pupil behavior domains sampled by the test items in each of the four parts are: II. Reading for Information—recall specific terms, note important details of information stated, recognize fundamental concepts, use the facts to answer specific questions; III. Reading for Relationships—sense relationships among ideas, note ideas which do or do not belong in a group, note the order of occurrence; IV. Reading for Interpretation—recognize the importance of each concept. Weigh the relative importance of ideas, derive inferences, conclusions, and predictions, understand the implications of stated ideas; V. Reading for Appreciation—sense the feeling tone, grasp the sensory impression, note the motivations of characters.

Selections for the listening component of the lesson plan were taken from the students' supplementary basal series, The Houghton Mifflin readers. The choice of material read to the children was based on considerations of length and purpose. Passages had to be short since the audience would be listening intently, and they had to lend themselves to the purposes set for the lesson, i.e., sequencing, cause/effect, etc. Reading selections were segments of basal stories being covered in class. The New MacMillan Reading Program served this purpose. Again, portions chosen accentuated the comprehension skills being taught.

### Results

The data were analyzed using two-tailed *t*-tests to determine the significance of the differences ( $p = .05$ ) between group

mean gains on four subtests of the comprehension instrument. No significant differences existed between groups on Subtest II, Reading for Information ( $t = 1.22$ ,  $p > .05$ ). However, significant differences were found on Subtest III, Reading for Relationships ( $t = 2.16$ ,  $p < .05$ ), Subtest IV, Reading for Interpretation ( $t = 12.17$ ,  $p < .001$ ), and Subtest V, Reading for Appreciation ( $t = 8.91$ ,  $p < .001$ ).

### Conclusions

There is at present little research that shows that activities such as the listening/reading transfer lesson will lead directly to gains in reading comprehension. However, like other response specificity techniques (SQ3R, Guided Reading Procedure, USSR), the listening/reading transfer lesson appears to be based on accepted theory and rooted in logic. It seems reasonable that reading with a purpose is more efficient and productive than reading without one. Students who read for specified reasons will be thinking as they are reading and not merely receiving information they are supposed to consume. The traditional basal reader format directs the teacher to introduce concepts and the vocabulary of a selection, and then, after children have read the story, to ask questions. The intent of this post questioning is to direct the students' attention to what they *should* have been looking for as they read. By setting purposes prior to reading, children are taught how to apply and extend their mental abilities as strategies for developing comprehension skills. Similarly, the listening component of the lesson functions as an illustrative, concrete sample of the skill that is to be utilized during reading. Since elementary school children can usually understand more when a passage is read to them than when they read it themselves, the combined employment of the auditory and visual modalities should enhance learning.

The results of this study indicate that including a listening/reading transfer supplement to basal reading activities can positively affect the so-called upper levels of comprehension. Since both groups in the study fared equally well on a test of reading for literal information, this may imply adequate treatment in this area by basal reading programs and lesser emphasis on relationships, interpretation, and appreciation of material read. These findings tend to affirm Cazden's (1972) and Smith and Barrett's (1977) recommendation that teachers must be aware of and consciously direct classroom activities toward developing higher level comprehension skills and less upon the memorization of endless factual information.

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## REACTION: EFFECTS OF LISTENING/READING TRANSFER

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The authors of this study have indicated that their purpose was to compare the effectiveness of parallel lessons in listening and silent reading to a more traditional basal approach to comprehension skills instruction. The results indicated that the group receiving the parallel lessons in listening and silent reading did significantly better on the higher order comprehension skills than the groups receiving lessons by a traditional basal approach. There was not a significant difference between the groups on the lower order comprehension skills at the literal level.

These results are not surprising since teachers using the basal teacher's manual exclusively often do not get to the higher order skills like interpretation, relationships, and appreciation. They become bogged down with introducing vocabulary, working with the structural and phonetic analysis skills, working with comprehension at the literal level, directing oral reading, and giving the children enough background to do the workbook pages that go with the lessons. The results in reverse seem to indicate that, if we are only interested in children learning decoding skills and in reading for information (or at the literal level), then the basal approach is enough. Skills such as asking for single item recall and finding the main idea are related to a literal interpretation of the story. If, on the other hand, we are concerned that children develop a higher order comprehension and thinking, such as singular and multiple inference, interpretation and concept analysis, relationships and differences, and appreciation and critical skills, we might need something else instead of or in addition to the basal approach.

One implication of this study is that active teacher involvement in the reading process might be a critical variable to developing better higher order comprehension skills. By getting the classroom teacher away from a reading program based solely on the basal and into an approach like the listening/reading transfer method, we are forcing them to get more involved in the reading process *with* the child. They become a participant in the lesson instead of just a rote giver of instructions and questions.

The basal approach is popular with teachers as it allows time to get things done while the children read and do the workbook pages and gives the teacher security in having covered "the essentials". The basal also does not take much preparation time for the teachers. As a matter of fact, many teachers can plan their reading lessons months in advance by just noting the basal pages to be covered and the corresponding workbook pages in their plan books.

The authors of this study have alluded that a problem with the basals is that they do not provide opportunity to read for a purpose. However, this reviewer has noted that teachers are often directed in basal manuals to ask a question to stimulate interest prior to asking the children to read. Doesn't that include reading for a purpose? The crux of the problem of the basal approach is the rote way it is often presented and the routine type of procedures that become established by the teachers using basals.

This study is valuable and should be replicated with elementary school children at different grade levels. In future studies, it might be well advised to assign children randomly

within classrooms to the experimental and control groups rather than assign whole classrooms into one group or the other. This type of research design would add to the validity of the findings as teacher effectiveness would not be a concomitant variable. Additionally, validity might be further increased by randomly assigning alternate forms of the pre and post tests to students in both groups to allow for possible difficulty differences between the forms.

Children enjoy being read to and it is possible that this enjoyment factor could be a concomitant variable positively affecting the children's attention and thereby affecting their comprehension of the intricacies of the story. One interesting extension of these studies could be to investigate the effect of this enjoyment factor.

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## ACQUISITION OF INCIDENTAL READING VOCABULARY

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Methods of teaching beginning reading have not changed significantly during the past 30 years despite strides in communication technology. However, one change that has been seen in reading materials is the advent of read-along books for prereaders and beginners. Read-along books or listen-and-read materials are printed stories which are accompanied by an audio recording of the story-text. The objective is for the child to listen to the spoken words as he/she views the printed text. Publishers imply or state that read-along materials help children learn to read.

Most reading experts support the concept of incidental sight word vocabulary for beginning readers, meaning, that some sight words are learned without intentional teaching or deliberate attempts at remembering (Brown, 1975; Hall, 1976). Thus, it would seem to follow that children could learn some sight vocabulary words merely from following along printed material while listening to a recorded version of the text.

The purpose of this study was to investigate the effect of using read-along materials on the acquisition of incidental sight reading vocabulary for prereaders and beginning readers. This research was designed to investigate the following questions: (a) do prereaders and beginning readers acquire sight vocabulary words from exposure to read-along materials; and (b) are some type of words learned more readily than others.

Whether or not research evidence supports the use of read-along materials for the acquisition of incidental sight word vocabulary has interesting implications for beginning reading instruction and utilization of teacher time. Some kindergarten and primary grade teachers are using listening centers with read-along or listen and follow materials in their classrooms. However, an extensive review of the literature of beginning reading, visual perception, sight word acquisition, and reading readiness fails to disclose published research relevant to norming data for the acquisition of incidental sight word vocabulary based on read-along or listen and follow materials for beginning readers. Carbo (1978) reports reading gains using a recorded book technique in a formal reading program with children having severe learning disabilities. Chomsky (1976) also reports reading gains for average third graders when commercially produced recorded books are utilized. A review of the research of sight word acquisition indicates some factors which may influence the number of trials

necessary to learn words in isolation (McNinch, 1976; Spring et al., 1979). Other studies have investigated the child's conceptualization of the spoken word as it relates to the task of beginning reading (Chomsky, 1972; Johns, 1976). In related research E. B. Coleman has investigated the effect of word readability on the acquisition of beginning sight vocabulary. Coleman developed a model for designing easy to read materials. According to Coleman, highly motivational reading materials when presented in either cartoon or film-strip format yield incidental sight vocabulary (Coleman, 1975). The Coleman research did not involve the use of auditory materials for acquisition of incidental sight vocabulary. The Coleman materials did focus on short one- or two-word cartoon-type stories. The currently available read-along materials are generally not as simplistic as those suggested by Coleman's model.

## PROCEDURE

The subjects of this study were 36 children from two kindergarten classes of a school located in a southcentral state. Data were collected from one class of 20 children in the spring of 1980, and from a second class of 19 children in the fall of 1980. Due to illness and family moves, data on three of the original subjects was incomplete and deleted from final analysis. Children in this study were age 5 years before October 1st of the year they were enrolled in kindergarten. Thus, children tested in the spring of 1980 were near the end of their kindergarten year and closer to age 6, while children involved in the fall of 1980 sample were closer to age 5 years and were at the beginning of the kindergarten year. The study included 16 boys and 20 girls.

Each child was individually pretested using 88 flashcards of the words contained in the read-along stories to be used in the study. Most of the words are from the Dolch list of 220 easy words. After pretesting, the children participated in 5 daily sessions lasting approximately 10 minutes with read-along materials. At the first session, the teacher oriented the children to the listening center equipment and storybooks. During each session a taped version of a story was played twice as each child paged through an illustrated, printed version of the text. The week following the listening sessions, each child was posttested with the 88 flashcards. In both the pretest and posttest situations, no time limit was imposed for response.

## DISCUSSION

Using the t-test it was found that both the spring ( $t=2.62$ ,  $p=.066$ ) and fall ( $t=2.54$ ,  $p=.007$ ) classes of children made significant gains in incidental reading vocabulary as a result of the read-along sessions. The chance probability of the spring gain was .0008 and for the fall it was .0023. There was no significant difference between the means of the combined scores (pre and posttest) of the spring ( $X=2.84$  and  $5.15$ ) and fall ( $X=17.47$  and  $19.94$ ) samples. However, the older children nearing the end of kindergarten had significantly higher pretest and posttest scores than did the younger pupils nearer the beginning of the kindergarten experience.

When gain scores of the two groups are compared however, there is no significant difference (tested probability of  $t=.4333$ ) between the spring and fall classes. Therefore, it appears that regardless of length of time in school the children did make significant gains in incidental sight vocabulary although the initial means of the two groups differed significantly. Thus, both groups had the ability to profit from the read-along materials.

The second area of concern of this study was relevant to the ease with which words are acquired. Due to the nature of the student sample, mostly short, easy, primary level words were included in the read-along stories. Approximately 77% of the words were four letters or less in length. The 88 different words included in the stories were analyzed for: (a) the frequency of occurrence in the stories; (b) word length measured in number of letters; (c) word configuration; and (d) presence of special features. In each case student gain scores were correlated with word characteristics. Findings indicated that the frequency of occurrence of a word in the story was not significantly correlated to word gain. There was a significant correlation of .32 between length of word as measured in number of letters and incidental sight word gain. Gain tended to increase as the length of word decreased.

The word configuration characteristic was subdivided into four categories: (1) those words with no ascending or descending letters; (2) words having ascending letters; (3) words having descending letters; and (4) words having both ascending and descending letters. An analysis of variance of word configuration characteristics group gain score means demonstrated that words of the category 1 type, those having no ascending or descending letters, were learned significantly more easily than the other types, while category 2 type words, having ascenders, were least often learned.

Special feature words were defined as words containing a double letter. It was found that this feature of double letter was not significantly related to acquisition of incidental sight word gain.

## CONCLUSIONS

Based on the results of this study it can be concluded that read-along materials can significantly increase the incidental sight word vocabulary of kindergarten children. However, when gain scores of children were analyzed based on their pretest knowledge of sight words, it was found that children with greater knowledge of sight words prior to exposure to read-along materials, gained significantly more words from the listening and following sessions than did their peers. In fact, as the experiment was in progress it was noted that children who scored low on the pretest did not appear to follow the printed text as the tape was played. Low scoring pretest children appeared to be less attentive to the task of following words. Post treatment investigation demonstrated that many of the low scoring children did not recognize word boundaries in print. In short, children with low pretest scores (less than 3 words recognized) were less able to gain from read-along materials. Children who recognized from 0 to 2 words on the pretest had a mean gain of 1.17 words, children who recognized 3 to 7 words on the pretest gained 2.6 words; and the children who identified 10 words or more on the pretest had a mean gain of 4.44 words. Children having the highest average pretest scores also had the greatest posttest gain scores.

It would appear that based on the results of this study it is beneficial for teachers and parents to make read-along materials available to kindergarten age children. Kindergarten children can increase their sight vocabulary through the use of read-along type materials. However, prior to utilizing such materials the child has need for prerequisite skills of (a) recognition of boundaries of printed words, and (b) understanding of left to right word progression. It may also be found that the child who has not developed the two above concepts has not yet acquired an interest or curiosity about the printed word and is not ready for reading from a motivational viewpoint. A caution relevant to read-along materials should

be noted, however. Most commercially available stories do not stress controlled vocabulary nor high frequency word repetition. It may be that although word frequency was not highly correlated with word gain, that difficulty of vocabulary load could influence sight word gain. Further studies in the areas of long term retention and child attitude relevant to read-along materials are recommended. It would be interesting to know if voluntary usage of read-along materials affects word retention and sight word gain.

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According to the major conclusion of this study, the increase of incidental sight words that was demonstrated by both groups of children can be attributed to the read-along activity. However, this is not necessarily the case. The absence of a control group to compare treatment effects limits the trustworthiness of this conclusion. Although the read-along treatment may have produced the increase in sight word identification, it is quite possible that time in school or some other exposure to printed matter is the actual determining factor. The pretest-posttest design that was employed in this study provides very limited evidence about the actual effect of the experimental treatment.

In the conclusions section, it is noted that students who knew more sight words than their peers gained significantly more new words than did their peers. Testing the effect of prior sight word knowledge is an insightful move, and the conclusion makes sense. The mean gain scores do indicate an increase in favor of the students who initially identified more words. But again, this hypothesis could have been tested more rigorously. Gain scores are notoriously inconsistent measures because they reflect the unreliability of both the pretest and posttest instruments. In addition, the statistical analysis used to compare the gain scores is not reported. Was a single t-test computed, multiple t-tests, or ANOVA?

Finally, analyzing the features of words that related to their acquisition as sight words is another positive aspect of this study. In future studies, overall word frequency (Carroll, Davies and Richman, 1971) and imagery rating (van der Veur, 1975) might be considered as other features to compare or else control. There is evidence that these features exert a powerful influence on the "learnability" of words.

This study is a step in the right direction. It asks important, relevant questions. Conducting the treatment with different sets of children at different times is one check of the stability of results. The effects on sight word acquisition of read-along materials, word features, and students' prior sight word knowledge warrant investigation in applied settings. The reactions included here suggest some additional steps one might take in order to more thoroughly test those effects. additional steps one might take in order to more thoroughly test those effects.

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### REACTION: ACQUISITION OF INCIDENTAL READING VOCABULARY

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In her investigation of the effects of having young students read along with tape recorded passages, Sullivan addressed one aspect of reading achievement: sight word vocabulary. This aspect deserves careful attention because meaning-oriented word identification instruction is based in part on helping students analyze their sight words. Furthermore, classroom teachers deserve applied research evidence to help direct their instruction. Basic research certainly has a place in developing a pedagogy of beginning reading instruction, but it seems that applied studies currently are being neglected in the professional literature. We require instructional research that investigates workable classroom activities such as reading along with taped versions of a passage.

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**COMPREHENSION INSTRUCTION OR ASSESSMENT—  
WHAT'S THE DIFFERENCE?**

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Durkin (1978-1979) has initiated efforts not only to define comprehension instruction and assessment, but also to ascertain whether or not elementary schools provide comprehension instruction as she operationally defined instruction. This stance by Durkin has brought accolades from many and disconcerted grunts from a few. But notwithstanding the fact that an institution as sacred as comprehension questioning has been under review and analysis,

the curiosity and interest of reading researchers and practitioners have been piqued in an almost unprecedented way. Weintraub (1978-1979) stated the importance of Durkin's work succinctly. "This report, if heeded by the profession, is destined to have tremendous impact on comprehension instruction" (p. 76). Farr (1978-1979) stated that "Professor Durkin's study has some very interesting conclusions, but if a reader . . . fails to challenge Durkin's definitions, procedures, and conclusions—then the reader has missed the essence of research" (p. 74).

This writer also believes that the very essence of research is becoming involved in the thinking process that a particular study represents, and not necessarily a wholesale delivery of hard facts. This paper will attempt to provide an activity that will seek to have as its result, provocative thinking about important educational issues. This is done with the biased posture that reading research is more of a process than it is a product.

### Defining Comprehension Instruction and Assessment

Durkin (1978-1979) rather irreverently sought to define comprehension instruction and assessment in order to examine through classroom observations whether elementary schools provided such instruction. Durkin used components of reading comprehension listed by Golinkoff (1975-1976) as a basis for her definition. These components include: Decoding—Identifying individual words; Lexical Access—Having a "meaning for the printed word in semantic memory"; Text Organization—Extracting "meaning from units larger than the single word, such as phrases, sentences, and paragraphs." (p. 633)

Durkin then made perhaps the most significant step since Neil Armstrong eased himself onto the lunar surface when she suggested that comprehension "instruction" can be defined as activities in which the "Teacher does/says something to help children understand or work out the meaning of more than a single, isolated word" (Durkin, 1978-1979, p. 488). She suggested further that comprehension instruction has transfer value in that it helps students understand the meaning of connected text not used in that instruction. Durkin then startled the reading researchers and practitioners by suggesting that comprehension "assessment" involved activities in which the "teacher does/says something in order to learn whether what was read was comprehended" (p. 490).

The distinction that Durkin made between comprehension instruction and assessment is, of course, the *sine que non* for understanding the current controversy. The following examples give readers an idea of what "teaching" comprehension entails as defined by Durkin.

1. In the context of sentences, the teacher teaches the difference between "and" and "or".
2. Teacher teaches the meaning and importance of key words (each, match, underline, etc.) in written directions by using sample sentences and explanations.
3. With explanations by the teacher, and through the use of sample sentences, the teacher teaches the children that certain words signal sequence (first, before, at the same time, later, meanwhile, etc.).
4. Teacher discusses, explains, or tells the meaning of "main idea" and "supporting detail". Paragraphs are analyzed by the teacher and students. Some of these paragraphs contain a main idea and supporting details. Others contain only a series of details. Comparisons between the two kinds of paragraphs are made by the teacher and students.

### Observing Comprehension Instruction

Thirty classrooms were observed in 17 schools in at least 13 different school systems for 300 hours in the state of Illinois. Grades three through six were included

since these were the grades that Durkin thought should be stressing comprehension. Reading and Social Studies were observed. Social Studies was observed to determine if teachers taught reading and study skills in the content area.

A request was made to see the "best" teachers. While there is no guarantee that the best were seen, it is likely that the worst were not. Teachers did not permit any research at the beginning or end of school, or during the weeks that preceded Halloween, Thanksgiving, Christmas, and Valentine's Day. What was seen was the "nucleus" of the instructional programs.

Each classroom was visited on three successive days which were scheduled so that all five days of the week would be included with equal frequency by the time the research terminated. This was done to reduce the likelihood that teachers would only be seen on an atypical day. The research began in September and continued until mid-May.

Reading comprehension instruction was observed for 44 minutes in 300 hours. The time was spent on comprehension assessment, writing assignments, and non-instruction. No teacher saw the Social Studies period as a time to help with reading. Study Skills instruction was not observed. According to Durkin, teachers in the study were primarily interrogators and assignment givers.

The influence of workbooks and assignment sheets was overwhelming. These constituted almost the whole of "instructional" programs. In every classroom observed, certain children did the work promptly and in a business-like manner. Others did what ever they could to avoid work. It could not be discerned whether a lack of interest or lack of ability accounted for the resistance. What could be identified were the discipline problems and chastisement that ensued.

Providing small classes and teacher aides was not a solution for classrooms studied. The class size average was 23 children. Some had only 11. In the classrooms that had aides, the teachers had them correcting workbooks. The result was more checking, according to Durkin, not better teaching.

### Examining the Definitions of Durkin and Hodges

Hodges (1980) challenged Durkin's definition of comprehension instruction and hypothesized that the introduction of another definition would lead to a much higher estimate of the time teachers devote to comprehension instruction in the schools. Hodges venerated Broudy and Palmer (1965) for having used more "historical exemplars of teaching" (Hodges, 1980, p. 300). Broudy and Palmer (1965) had presented a set of phases that occur regardless of the particular style of teaching. These involved: preparation for instruction; motivation; presentation of the learning task; inducement of the trial response; correction of the trial response; fixation of the response; and test response and evaluation (1965, pp. 9-12).

Notice that the first three of these phases could possibly involve a teacher saying or doing something to aid understanding. The last five phases are usually associated with testing.

Hodges then marched majestically backwards and attempted to apply *Principles of Instructional Design* by Gagne and Briggs (1974) to reading comprehension instruction. Gagne and Briggs list the following instructional events which were used by Hodges in developing an alternative definition



of comprehension instruction: gaining attention; informing the learner of the objective; stimulating the recall of prerequisite learnings; presenting the stimulus material; providing 'learning guidance'; eliciting the performance; providing feedback about performance correctness; assessing the performance; and enhancing retention and transfer (p. 135).

Notice the lack of direct verbal instruction in these "instructional events." Hodges (1980) criticized Durkin's emphasis on direct verbal instruction. Hodges stated that she could only "assume that the teacher must be involved in direct verbal instruction of some kind for the behavior to be considered as comprehension instruction" (p. 300).

Hodges included interrogation after reading, "helping" with assignments by asking additional questions, and even checking of workbooks by the child and teacher in her definition of reading comprehension instruction.

Hodges then took Durkin's data which reported that comprehension instruction represented less than 1% of the observation time in reading, and re-analyzed the data using the alternative definition. The re-analysis of Durkin's data using Hodges' alternative definition of comprehension instruction revealed that 23% of the time was spent in comprehension instruction. However, both agreed that direct verbal instruction by the teacher received the least emphasis, and questioning by the teacher received greatest emphasis.

These data obviously require researchers and practitioners to examine the research literature concerning the efficacy of questioning as an aid to learning. What effect do teacher questions have on comprehension? Do questions help in teaching a student how to comprehend?

### Reviewing the Research on Questioning

There are several types of questions reported in the research literature. These include adjunct questions, preposed questions, and postposed questions. Questions inserted into running text are called adjunct questions. Questions placed before a passage are called preposed questions.

Some studies (Frase, 1970; Rothkopf, 1966) have shown that preposed factual questions direct students toward finding answers to specific questions. However, incidental learning and depth of comprehension are affected.

Other studies have suggested that postposed questions assisted students not only in learning and retaining answers to the questions, but in learning additional information in the passage as well (Rothkopf, 1966; Frase, 1967, 1968, 1969; Cohn, 1969). Other researchers have suggested that students, if given time to review, are encouraged by postposed questions to review the assignment for answers to the questions (Heller, 1974; Watts & Anderson, 1971). Yost, Avila, and Vexler (1977) demonstrated that as the complexity of postposed questions to seventh graders increased, achievement increased. The amount of time spent working on the questions also increased with question complexity.

Rothkopf and Bisbiscos (1967) suggested that adjunct questions placed at the end of a section in a passage assisted students' attention and helped them to read the materials following the questions. However, Singer and Donlan (1980) stated that caution had to be exercised with the use of adjunct questions since they tended to narrow students focus of attention.

Several studies in the research literature have suggested that student-generated questions have a facilitative effect on both immediate and delayed recall (Chodus, Gould, & Rusch, 1977; Rosenthal, Zimmerman, & Durning, 1970). Helfeldt and Lalik (1976) demonstrated that reciprocal student-teacher questioning was found to be superior over teacher questioning

alone. Singer and Donlan (1980) suggested that if students imitate their teacher's questioning and formulate their own questions, they have the benefits of both preposed and postposed questions.

This writer would like to suggest that these studies to date regarding questioning have been measuring the effect that testing, formal and informal, has on comprehension. The research data suggest that the testing of students by asking comprehension questions affect later attempts to comprehend. Asking questions does indeed tend to shape the student's behavior, whether done by the teacher or by the students themselves. The data suggest that when students are faced with an evaluative exercise, the subjects attempt to do whatever they must to score well and please the tester.

### Applying Content Area Strategies to General Comprehension Instruction

Spache and Spache (1973) state that there have thus far been two opposed viewpoints on developing comprehension, and postulate that both have failed to solve the problem.

One group emphasizes long lists of comprehension skills and the need to develop these. . . . Apparently this group believes answering a lot of questions, time after time, will enable the student to show whatever type or degree of comprehension later reading tasks demand. Another group of experts believe that the answer to comprehension development is to start with students' experiences and interests and exploit them. Actually both groups borrow ideas and training materials from each other and neither really practices what it preaches (p. 558).

This writer agrees with that analysis, but would suggest that the former group of interrogators far outnumber the latter group. The studies by Durkin (1978-1979) and Hodges (1980) support that allegation.

The current practice of using questioning to develop comprehension seems to be supported well by the research data as being an effective way to shape student behavior. That is really not the issue. In this writer's mind, the genuine issue raised by the Durkin study is whether or not direct verbal instruction by the teacher prior to the student's response can become a veritable alternative considering the state of the art. Can we in the field of reading do or say something before we initiate the interrogation that will actually aid the students substantially in their attempts to comprehend? Can we do more with comprehension skill instruction than start with students' experiences and interests, and/or ask comprehension questions?

This writer would like to introduce the idea that researchers may need to start looking at strategies used for content area reading improvement in an attempt to discover their potential application to general reading comprehension development. These instructional practices, heretofore neglected in general comprehension development, offer interesting possibilities.

Herber (1978) suggests that comprehension questions are assumptive. Heber states:

If students already are able to identify the significant information, to perceive the relationships in that information so as to formulate related ideas, or to synthesize those ideas with prior knowledge and experience, they already would have the skills which the teacher intended to teach when he or she asked the question (p. 193).

Herber, the research on questioning notwithstanding, then made the interesting statement that "If the students cannot do all this because they lack the skill, then no amount of asking—at whatever rate of frequency—will teach them how to apply the unknown skill" (p. 193).

Herber was looking to the teacher as a possible resource for doing or saying something prior to interrogation that would substantially assist the students in their attempt to com-

prehend. Herber suggested the radical idea that guides for different comprehension levels might be made up of declarative statements rather than questions. For example, a student who does not respond independently to questions at the interpretive levels would be provided with a guide of declarative statements. These statements are created by teachers asking themselves interpretive questions similar to the following:

"What does the author mean by what he says? What conclusions can I draw from this information? What is the author implying, and what inferences can I draw?" As the teachers respond to the questions, they write down the answers as declarative statements (Herber, 1978, p. 195).

These statements are then given to students on reading guides and serve as direct verbal instruction from the teacher. What a refreshing thought to think of inserted declarative statements from the teacher or from basal authors in a basal series serving as direct verbal instruction for the students who need it.

Estes, Mills, and Barron (1969) revealed the efficacy of structured overviews in developing comprehension. A structured overview is nothing more than a brief summary, abstract, or diagram for the content of a story (Singer & Donlan, p. 61). Tierney, Readence, and Dishner (1980) suggested that a structured overview can be presented as a picture or schematic diagram. Barron (1969) stated that the words in a structured overview assume the form of advance organizers and provide students with cues to the structure subjects. Earle (1969) suggested that structured overviews present to the students an idea framework designed to show important relationships.

How awesome to think of a basal reading series with a schematic drawing presented before a story in an attempt to use advance organizers with the young readers. It is mind boggling to consider the profundity of change that might occur in students' comprehension if the brief summaries or abstracts of stories used in basal teacher manuals were also duplicated in the students' books. These abstracts have vastly improved the teachers' comprehension of these stories. I think it safe to hypothesize the abstracts would also aid students' comprehension. Of course, a major problem might center around the lack of motivation when abstracts "spill the beans" and teachers could no longer furtively say, "Read the next page and find out why Jimmy couldn't buy the wagon from Mr. Jones."

Glossing has gained renewed popularity recently, particularly in Social Studies and Science textbooks (Singer & Donlan, 1980). "Essentially the gloss is like a teacher accompanying a student through a text" (Singer and Donlan, 1980, p. 56). Glosses are notes written in the margins of texts to serve any content or process purpose. Singer and Donlan suggest the following steps for teachers to follow in writing marginal glosses.

1. Read through the text, identifying vocabulary or other material to emphasize or clarify.
2. Write marginal glosses on ditto masters with page numbers and line numbers indicated on the left hand side of the ditto master.
3. Give dittoed glosses to students who insert them in their texts and refer to them as they read.

Estes and Vaughan (1978) have stated that study guides: develop reading skills rather than assume reading skill; compensate for individual differences rather than ignore individual differences; tend to facilitate teaching and learning rather than testing; and focus on conceptualization instead of recall.

This writer would like to suggest that researchers seeking to explore ways of introducing direct verbal instruction prior to interrogation in general comprehension development need to

examine the merit of reading guides.

Herber (1978) spoke of the need for content teachers to illustrate concepts visually for students in order to augment comprehension development. Never has this writer found in the section of the basal reader entitled "Preparation for Reading" a suggestion that the teacher draw to illustrate what happened prior to reading. This certainly should not happen with every story. But if the teacher is to teach the main idea before students are asked to give the main idea, this technique may result in the recognition of more main ideas.

## INFERRING THE DIFFERENCE

What is the difference in comprehension instruction and comprehension assessment? This writer would like to gingerly assert that the teaching of most things includes four major phases in a suggested order. These phases in rank order include instruction, application, practice, and evaluation. In the initial phase of instruction, the instructor plays the most conspicuous role while the learner plays the least obtrusive role. In this first stage, the instructors prove themselves by doing or saying something that significantly enhances the possibility of success for the learners during the later phases of application, practice, and evaluation. The process then begins to reverse itself. By the time the evaluation phase (or comprehension assessment phase) is encountered, the learner plays the most conspicuous role, with the teacher in the background. Heretofore, comprehension development more exuberantly emphasized the utilization of the last three phases: application; practice; and evaluation. More often than not, application has been the initial phase rather than a corollary of instruction, and not altogether unjustifiably so. The state of the art just now involves questioning of our procedures. A definition of general comprehension instruction will only become an empirical reality after reading researchers have evaluated and chosen techniques that an "instructor" can efficiently and effectively use prior to application, practice and evaluation.

Notwithstanding our lamentations, most of our students are comprehending as evident from the National Assessment of Educational Progress (Gadway & Wilson, 1976). It cannot be disputed that most learners do very well with the typical instructional events that Hodges (1980) lists. Gaining attention, setting objectives, presenting a stimulus, eliciting the performance, and assessing the performance do indeed seem to result in achievement for those who can and do perform. Durkin has not disputed that. However, the National Assessment of Educational Progress and Durkin's data show that many of the students have not performed under these conditions.

The great debate over analytic and synthetic phonic instruction which has now spread over a century has taught us that eclecticism is necessary in choosing instructional strategies for decoding and early reading. A lack of eclecticism in comprehension development is what the research by Durkin makes so vividly clear. The teachers observed used virtually no direct verbal instruction. "This lack of eclecticism in reading comprehension instruction could prove as limiting as the lack of eclecticism in decoding strategies if we strive for full development of all the students' comprehension abilities" (Cloer, 1980, p. 567).

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## TEXTUAL CONSTRAINTS AFFECTING ADULTS' FREE RECALL

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Traditionally, the informal reading inventory (IRI) has been employed as a criterion-referenced test to determine students' reading comprehension ability (Farr & Roser, 1979). The most important component of silent reading achievement evaluated is the level of difficulty at which a reader can comprehend. This can be better determined by means of a well-constructed, well-administered IRI than by a standardized achievement test (Harris & Sipay, 1980). Silent reading comprehension is based, for the most part, on a student's ability to recall exact wording in order to answer specific literal questions. The most commonly used clinical informal reading inventory, *The Durrell Analysis of Reading Difficulties* (Durrell, 1955), goes so far as to ask the reader to verbalize all he/she can recall from the passage.

If literal recall for specific words from a passage is the deciding factor for determining silent reading comprehension on an IRI, could a scoring system based on memory for exact words from passages be developed so that a silent reading IRI might be administered to groups and then computer graded? One serious disadvantage to the administration of silent IRI is time required for individual testing. The development of such an instrument would benefit both classroom teachers and researchers investigating adult reading ability. Kirsch and Guthrie (1977-78) have noted the lack of a useful measure of functional literacy, which again, appears to be, on the most elementary level, ability to recall exact wording of text.

This study investigates the following:

- (1) How well do adults (chronological age: 20 to 88) remember exact wording from three expository paragraphs?
- (2) How is adult memory for wording related to independent variables including sex, age, level of education, content of passage, or type of purpose question (advanced organizer or prequestion)?
- (3) Is wording of IRI paragraphs deemed equivalent remembered equally well across paragraphs?

This study examines adults' long term memory for wording, a concept differing distinctly from memory for propositions. Klatzky (1980) cites previous research demonstrating that adults' memory for propositions is much better than their memory for surface structures, the specific wording of a message. McKoon and Keenan (reported in

Kintsch, 1974; McKoon, 1977) found subjects' memory for specific wording had vanished 20 minutes after original reading of a passage. Subjects apparently prioritized propositions which were then apparently more accessible for retrieval. However, results of a study by Anderson and Paulson (1977) indicate that although memory for verbatim information rapidly declines after presentation, subjects retain some information about wording of the initial sentence for intervals longer than those of STM storage.

Prior research in mathemagenics and discourse analysis suggests that long term memory for prose is affected by advanced organizers (purpose questions or pre-questions). Retrieval of information from long-term memory forms the basis for most measurements of silent reading comprehension of text. Gagne' and Memory (1978) noted that teacher-directed techniques for enhancing silent reading comprehension usually include some sort of purpose question presented to the reader prior to actual reading. Results of their study focusing on the effect of particular prequestions pinpointed three instructions that encourage the reader to relate old and new information for most effective recall of long term memory for prose:

- (1) try to form a vivid mental image of the material being read;
- (2) read to see how the passage is like a familiar example; and
- (3) provide the reader with background information.

Gagne' and Memory noted the importance of conducting research of this type using multiple passage, such as those offered in the *Ekwall Reading Inventory* (1979), in order to demonstrate generalizability.

## METHOD

### Subjects

The 72 adults participating in this study were divided into four age groups: 20-39 ( $N = 31$ ), 40-59 ( $N = 13$ ), 60-79 ( $N = 26$ ), and 80-88 ( $N = 2$ ). The 11 males and 61 females demonstrated three levels of education: high school degree ( $N = 9$ ), college degree ( $N = 47$ ), graduate degree ( $N = 16$ ). Adults in the 20-39 year-old age division were undergraduate and graduate level students enrolled at the University of Southwestern Louisiana. Mature adults belonged to the JOY (Just Older Youth) Club at the First Baptist Church, Lafayette, Louisiana, and are, for the most part, retired professionals (classroom and college professors, teachers, ministers, or doctors).

### Learning Materials and Procedure

Three expository passages of 163 words (Forms A, C, and D) were selected at random from the *Ekwall Reading Inventory* (Ekwall, 1979). Readability level of the passages was determined to be eighth grade level, based on the Harris-Jacobson Readability Formula (Harris and Sipay, 1980). Passages were composed by Ekwall, and normed on 40 students. Reliability of passages, based on administering forms within a period of one week, resulted in product moment correlations of .79 between Forms B and D, and .82 between Forms A and C. For the purposes of this study the three passages were crossed with three different directions: (1) form a vivid mental image of the information in the following paragraph, (2) compare the information in the paragraph to a familiar, concrete example, or (3) this specific information relates to the following paragraph.

Ss were tested in small groups; they indicated age, sex, highest achieved level of education and occupation at the top

of a page, read the direction provided for the paragraph, and then read the paragraph at their own rate. When all Ss had finished reading, they received one of two distractor tasks: (1) a serial learning task comprised of 12 neutral words presented in four trials with words exposed for a two-second interval, or (2) a lecture on reading activities which enhance the lives of the aged. Each distractor task lasted 25 minutes. Long term memory for wording was triggered by the following vague probe stimulus: "Write down all you can remember about the paragraph you read earlier."

Protocols were scored on the basis of exact memory for wording. Ss received 1 point for each word which appeared on the original 163-word paragraph.

## ANALYSES

Free recall of wording by adults in this study was analyzed via 3 X 3 ANCOVA (passage by direction), with age, level of education and sex of subjects as covariates. No statistically significant main effects for direction or passage type were noted, ( $p < .77$ ,  $p < .49$ , respectively). The two-way interaction was also statistically nonsignificant ( $p < .81$ ). However, age of Ss was a statistically significant covariate ( $p < .05$ ) and subsequent one-way ANOVA and follow-up analyses of means of words recalled by the four age groups revealed that Ss aged 20-39 differed significantly from Ss aged 60-79 and SS aged 80-88 in recall of exact words from paragraphs. The 20-39 year old adults remembered, on the average, 37.4 words (25%) of the 163-word paragraphs; Ss 60-79 recalled a mean of 29 words (18%), and SS 80-88 recalled an average of 11.5 (7%) words.

Statistically significant differences were noted in one-way ANOVA of level of education across words ( $p < .05$ ). Subjects completing a graduate degree recalled an average of 39 words (24%) compared with subjects who completed a high school degree ( $X = 25.6$ , 16%). A negative Pearson correlation coefficient ( $r = -.58$ ,  $p < .01$ ) was noted between level of education and age; the older the subject, the less formal schooling received.

## DISCUSSION

Prior research investigating adults' memory for wording (Klatzky, 1980) was supported by the results of this study: 75% or more of adults' memory for surface structure (specific wording of a passage) had vanished 25 minutes after the reading of a passage. The exact words recalled were, for the most part, content words (nouns, verbs, adverbs, adjectives, e.g., *latex*, *altitude*, *transportation*, from the paragraph on rubber production) coupled with determiners (*a*, *an*, *the*). Anderson and Paulson's (1977) findings are also corroborated: some information about wording of the initial sentences is retained for intervals longer than those of short term memory storage. Subjects conceivably prioritized certain propositions and then rehearsed them, thus earning easier access for retrieval when needed for recall 25 minutes later.

No differences in memory for wording resulted from direction or passage type. Ekwall's three eighth-grade passages appear equivalent, if memory for exact wording is being measured. Teachers administering IRI's should note, however, that the longer a student is asked to wait before he answers literal questions from a passage, the more likely she/he is to reword and restructure the answers. Ability to recall exact wording of a paragraph, a skill necessary to respond to many specific literal questions, fades quickly, even in college subjects accustomed to professors requiring recall of exact phrasing over an extended period of time.

Matured adults (60-79) recalled, on the average, 8.2 words less than adults aged 20-39, but this represents only 1.7 words less than adults aged 40-59. A practice effect may have influenced scores since Ss in the 20-39 age category were all enrolled in college degree programs which require students to regularly practice reading and remembering wording from prose. Long term retention for wording of prose may prove responsive to structured training focusing on repetition. Gagne' (1978) notes that timing and nature of the repetition may be important factors in retention of prose; she suggests that it is time to refine research on the effects of repetition.

Memory for wording (literal recall of passages) could prove a viable field of study for researchers investigating adult reading performance. Evaluation of achievement is totally objective, while scoring may be computerized, and unlike many aspects of propositional analysis, is adaptable to group administration.

A cautionary note is interjected, however: only the very basic element of comprehension, literal recall, is being measured in this study. No attempt has been made to examine quality of recall or active reasoning about concepts remembered by subjects.

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further to project that the amount of a person's reading is determined partly by his education and partly by the class of people to which he belongs. In other words, educational status and socioeconomic status are closely related to one another and to the amount and kind of reading done.

Certain magazine editors have long claimed audiences consisting of a class market. For example, *Fortune*, *Harpers*, and *Business World* have boasted of executives among their greatest clients; and the nature of articles in *Vogue*, *Esquire*, *Playboy*, and *Reader's Digest* requires at least a high school level of comprehension, if one is to read and enjoy them. Dulin (1969) researched the readability levels of adult magazines measured by four prevailing formulas and found that the reading difficulty of many of the popular ones that were earlier reported in a dissertation by Allias (1957) as having relatively low-difficulty levels had changed considerably. Among magazines on the Dulin list with college level reading difficulties were: *Reader's Digest*, *T.V. Guide*, *Esquire*, *Life*, *Ladies Home Journal*, and *Good Housekeeping*; while upper high school levels showed *McCalls*, *Redbook*, and *Post*; and at the lower high school grades was *Sports Illustrated*. Dulin attributed the increase in difficulty to two factors: (1) articles of near-scholarly interest are now appearing in them, and (2) general reading levels have risen over the years.

In re-emphasizing the values of reading to society, Dallman (1978) and her associates expressed the view that people who cannot read critically may be easily manipulated by the unprincipled who may solicit their time, attention, or votes. Further, they may not be able to contribute to their country through intelligent participation in decision making, and in action necessary for the security of their state and nation. In our technological age, people in business, industry, and the professions who find themselves unable to cope with the vast amount of reading materials which must be covered and understood within restricted time limits are decidedly handicapped.

Only a few weeks ago, Dieter (1980) pointed out that higher education is undergoing what may be the most significant internal change in half a century. "Professional fields such as engineering and business are becoming more important to this nation's economic growth and quality of life . . . Better engineering is becoming increasingly critical for the survival of America's standard of living . . . Declining natural resources, over-population in third world countries, poor health and malnutrition, and potential world conflicts are problems that are not going to go away" (p. 56). The impact of this big shift in students' majors in colleges and society, and other problems we face today bring clearly into focus two important implications: (1) business, industry, and other community organizations should provide courses, materials, motivation, opportunities, and incentives for their employees and other adults to keep abreast, via reading, of critical issues facing the country, and (2) colleges should provide more help to students enrolled in courses designed to prepare them for greater usefulness to the country.

While many studies have shown both college students and out-of-school adults to be interested in reading fiction and light poetry for relaxation, others have shown both groups to be caught up in the literature which reflects the times. For example, in Fagin's study (1929), students at Johns Hopkins were polled to ascertain their favorite periodicals and showed preferences in current events, problems, and conditions that determine the pattern of their existence. Two decades later, Weingarten (1949) studied the reading preferences of over 500 veterans in a Chicago junior college to find that many of the 224 magazines choices were related to vocational and

## COMPREHENSION OF CRITICAL NEWS ITEMS AS EXPRESSED BY COLLEGE STUDENTS AND ADULTS IN BUSINESS, INDUSTRY, AND RELIGION

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Researchers have concerned themselves with matters of comprehension and reading interests of individuals and groups of every age and level of education for more than a century. The results of various studies led Fisher (1962) and Smith (1964) to conclude that education seems to exert an important influence on readership. Russell (1960) goes a step

avocational interests with 189 in scientific and 70 in businesses. The overall preferences of this junior college group indicated a strong interest in the realities of life—issues of a post-war world and the problems of individual adjustment. Near the end of the next two decades, Adams (1969) studied the reading preferences of students in Lebanon, only to find that, having been recently uprooted from their homeland, they were reading political history and biographies of men of revolutionary stature in the hope of finding survival techniques.

From among the many concerns facing our country today, the researchers chose two for this study: *The U.S. and Iran—The Hostage Crisis* and *The U.S. Energy Problem*. These two concerns affect the lives of all Americans without regard to race or sex, and are explored in depth in current magazines. Are our college students and our out-of-school adults going beyond the mere listening to fleeting and often controversial news bits on these two national concerns to read and digest for themselves information that may be helpful in decision making and in intelligent and unbiased discussion of them? The best way to ascertain the answer to this question is to ask them directly.

The problem of this study, then, was to determine the extent of the reading comprehension of college students and adults on two critical issues of national concern; namely, *The U.S. and Iran: The Hostage Crisis*, and *The U.S. Energy Problem*.

### Method and Procedures

In the absence of a standardized instrument to measure the comprehension of college students and adults on two national issues, members of the East Texas Educators Research Council devised an informal questionnaire for this purpose. Hypotheses proposed were as follows:

1. When presented with a set of test questions subsequent to having read a brief related article, the mean total comprehension score of adults will equal or exceed the mean total comprehension score of college students.

2. When presented with a set of test questions subsequent to having read a brief related article, the mean comprehension score of males will equal or exceed the mean comprehension score for females.

Content of the articles used in the test instrument was taken from issues of *U.S. News and World Report*, *Newsweek*, and *Reader's Digest*, 1979-80. Each of the 10 articles contained from 120 to 150 words, and was followed by 4 multiple choice questions and 1 open-ended question. Comprehension skills tested for included: (1) main idea; (2) correct details; (3) inferences, and (4) conclusions or judgments. Participants were instructed to read each article carefully, and to answer the first four questions by placing an "X" in the box opposite the best answer. Additionally, they were told to complete every fifth item by adding words or phrases to present a reasonable judgment or conclusion.

To prevent the adverse effect of the time variable, participants were instructed to take as much time as needed for completion of the questionnaires. Carlson (1949) and Rankin (1962) reported studies which found that the imposition of time limits which do not permit slow readers to finish answering questions, obviously favor the faster readers on the comprehension scores. Concurring in this notion, Webb (1966) suggests that the time element, together with such other factors as lack of familiarity with tests, with the materials, and the novelty of a test-taking role, tend to depress responses and may be selectively biasing for participants of different educational levels.

Comprehension was measured as the number of correct responses on each of the comprehension skills and the total.

### Findings and Discussion

One hundred seventy-five questionnaires were presented to out-of-school adults for completion, and of this number 109 were returned in usable condition. This represents a return of 62%. The college students were presented 97 questionnaires, and all (100%) were returned in usable condition.

Of the total number of questionnaires presented to out-of-school adults, 150 were mailed and 25 were delivered directly to managers in business ( $N = 35$ ), industrial ( $N = 45$ ), and religious organizations ( $N = 29$ ) for use by their salaried personnel. College students were administered the questionnaire during a regular class session. The number of male participants were: industry with 28 or 62% of the total of 45; religious groups with 20 or 69% of a total of 29; business with a total of 17 or 49% of a total of 35.

The highest number of females returning usable questionnaires were from business for a total of 18 or 51% of 35. Next highest were participants from industry with a total of 17 or 38% of 45 in that group. Only nine females returned usable questionnaires from religious organizations. Five of the 25 persons who accepted hand-delivered questionnaires were visited at least three times to retrieve them. Each time the persons either stated that they forgot them, or they did not have time to complete them, while at least two dozen of those who received mailed questionnaires telephoned to say that they were still working on them and would mail them in, even beyond the deadline given them.

### Results

*Hypothesis I.* The scores for the 109 adults ranged from 90 to 54, with a mean of 75.9 and a median score of 76, while for the 97 students the range was from 64 to 26, with a mean of 46 and a median of 48. Results of a *t* test indicated that the mean difference was significant at the .01 level.

*Hypothesis II.* The scores for the 65 adult males ranged from 90 to 62, with a mean of 74.89. The scores for the 46 college males ranged from 64 to 32 with a mean of 48. This difference computed by *t* test was significant at the .01 level.

The scores for the 44 adult women ranged from 84 to 54, with a mean of 72.63. The scores for the 51 college females ranged from 60 to 26 with a mean of 44.12. This difference computed by *t* test was significant at the .01 level.

There were no significant differences between adult males and adult females or college males and females on comprehension scores. When questions were analyzed by type, there was little variation among adults. For students, however, there was great variation. In general, students were able to answer questions concerning the Iranian crisis better than the energy crisis. They could answer stated main idea questions, but not implied main ideas, and if one of the response foils was a direct statement from the text, that response was more likely to be selected whether it answered the question or not. Inference and generalization questions were all poorly answered.

### Conclusions

As shown in Table 1, adults indeed read and understand newtype items better than students. This is a disappointing finding, since college students are among our best hopes for future leaders. The results may be due in part to several factors, among which are: (1) level of interest; (2) level of



experience; (3) lack of prior knowledge on the part of students; (4) problems with reading; and, to some extent, (5) educational level and socio-economic status combined. It should be noted that people in business and industry are salaried, and are constantly in an environment which is stimulated by talk of current events. An implication for teachers in college reading laboratories would seem to be that more materials of current news-types should be required of students. Additionally, more direct instruction in answering questions of an inferential nature should be provided. Further research is needed on methods which best facilitate this type of skill.

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Table 1

## COMPREHENSION SCORES OF ADULTS AND STUDENTS BY SEX

ADULTS			STUDENTS		
Scores	(f) Males	(f) Females	Scores	(f) Males	(f) Females
90	1	0			
88	3	0			
84	4	1			
82	7	1			
80	6	6			
78	7	8			
76	10	6			
74	8	2			
72	12	7			
70	2	2			
66	3	2			
64	0	3	64	1	0
62	2	3	62	0	0
60	0	0	60	1	1
58	0	0	58	4	0
57	0	2	57	0	0
56	0	0	56	2	4
54	0	1	54	5	3
			52	4	6
			50	8	4
			48	2	5
			46	1	2
			44	4	4
			42	4	4
			40	4	3
			38	3	3
			36	1	4
			34	1	1
			32	1	3
			30	0	1
			26	0	3

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The conflicting dichotomies of "good" and "poor" readers or "good" and "poor" comprehenders influenced the research questions of this study. Golinkoff (1975-76) reviewed the literature which characterized good and poor comprehenders and concluded that there may be multiple types of poor comprehenders. Her conclusion seems to be important to consider when investigating the conflicting lists of characteristics. For this study it was recognized that there would probably be more than one profile of characteristics of the poor comprehender; yet, it was helpful to study these identified characteristics as possible indicators of comprehension and related problems of the selected remedial readers.

Goodman (1973) described poor readers as those who overrely on phonics or those who are too concerned with word accuracy even when meaning is lost. He further described poor readers as those who have a high frequency of correcting miscues which do not affect the meaning. Perfetti (1977) and Golinkoff (1975-76) reported that poor comprehenders have limited decoding skills which hamper the process of reading for meaning. They indicated that poor comprehenders fail to self-correct according to meaning because they are so concerned with the correct pronunciation of words rather than relying on semantic, syntactic, and contextual information.

Conversely, Jenkins et al. (1980) described good readers as good "hypothesis testers" who are flexible in their use of word analysis skills. Good readers are often described as sophisticated guessers who use cues productively (Samuels, Begy & Chen, 1975-76). Wheat and Edmonds (1975), purported that proficient readers have learned to increase their use of non-visual cues (syntax and semantics) and decrease their use of visual cues (grapho-phonics). Beebe (1980) found that self-corrections based on meaning and the use of syntactic-semantic cues were important predictors of reading comprehension.

The role of semantic and syntactic cues in fluent reading and reading comprehension has been the basis for much controversy. Several reading authorities differentiate good and poor readers according to their use of contextual information (Goodman & Goodman, 1977; Guthrie, Seifert, Burnham & Caplan, 1974; Smith, 1975; Weinstein & Rabinovitch, 1971). Others have argued that virtually all readers, regardless of achievement, employ semantic cues and that other factors account for achievement differences (Allington, 1978; Allington & Strange, 1977; Kolers, 1975; Weber, 1970). Allington and Strange (1977) found that poor readers ignored the grapho-phonetic cues in text but used syntactic and semantic information more often than did good readers who seemed to be more constrained by the visual information.

Context, semantics, and syntactic cues are not the only set of cues which readers need, but the interaction of various skills and abilities seems to be the answer. Dahl and Samuels (1977) illustrated the interactive nature of skills when investigating the hypothesis test training method in which teaching students to use a combination of semantic, syntactic, and grapho-phonetic skills produced significant achievement. Research seems to be needed which will further investigate intervention methods designed to develop the reader's strategy for employing various cue systems.

The one strategy which has been used most often to assess, monitor, and/or teach the use of context cues is the cloze procedure. Guthrie et al. (1974) found the maze technique, a variation of the cloze, to be a sensitive indicator of comprehension and a method to monitor comprehension instruction. Ammon (1975) concluded that cloze can encourage children to generate words which meet the syntactic and semantic constraints of the sentence. Children trained in cloze

## TEACHING READING DISABLED STUDENTS TO READ FOR MEANING: A RESEARCH STUDY

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At the Child Study Center of Peabody College of Vanderbilt University, a study was conducted to investigate whether a selected teaching strategy would increase reading comprehension of a group of remedial readers. The Child Study Center is an institute for graduate and undergraduate students enrolled in education, special education and psychology programs. One aspect of the Child Study Center program is an after school remedial reading tutorial program for school age children. Both pre-service and in-service teachers are tutors for this program.

For the purpose of this study, reading comprehension was defined as the meaningful interpretation of written language through an interactive process (Adams, Anderson and Durkin, 1977; Adams and Collins, 1977; Cary and Smith, 1978; Smith, 1979). In order for comprehension to occur, the reader must be able to extract grapho-phonetic, semantic, and syntactic cues from the text, interpret these cues and construct meaning by integrating the textual information with previous knowledge.

## Method

**Subjects** To investigate these questions, we conducted a pilot study with a group of fifth graders described as remedial readers. Fifth graders were chosen as it was felt that students at this level would have been introduced, at least, to the use of various cue systems to decode words (e.g., grapho-phonics, semantic, and syntactic) and initial testing could determine which cues, if any, these children were using. The sample consisted of 20 children referred to the remedial reading tutorial program at the Child Study Center. The age range of the group was 9 to 11 years with the mean age 10 years, 4 months.

**Procedure** Upon entry into the program all children were randomly assigned with replacement to either the treatment or control group. All students were pre- and posttested on the *Gilmore Oral Reading Test* (Form C & D, respectively), *Stanford Diagnostic Reading Test — Literal and Inferential Comprehension Subtests* (Form A & B respectively), *Children's Attitude Toward Reading Test* (CHART), *Reading Miscue Inventory*, and *Woodcock Reading Mastery Test — passage comprehension subtest* (Form A & B, respectively). The tutors for the project were also randomly assigned with replacement to one of the two groups. The tutors and students were unaware that they were placed in the treatment or the control group.

Prior to the study, 20 pre-service teachers enrolled in an advanced reading methods course entitled "Remedial Reading and Practicum" were selected to be the tutors for this study. All tutors completed the course before the study was implemented. All tutors were taught to administer and analyze children's oral reading on the *Reading Miscue Inventory*. Evaluation of their performance yielded a reliability estimate of .94. The tutors assigned to the experimental group were taught how to develop the selected teaching activities and were provided a script to follow for the teaching procedure. During the interventions these tutors were observed (through one-way mirrors) by external evaluators who found little or no deviation from the script, with a reliability estimate of .96.

There were 14 sessions in the total study. Four sessions were used for pre- and posttesting with 10 sessions for the intervention. At each of the 10 teaching sessions, the experimental group received the teaching activity for no longer than 30 minutes and the regular remedial reading program. The control group received the regular remedial reading program. The regular remedial reading program was defined as the diagnostic prescriptive program planned according to the initial assessment information. All tutors analyzed the pretest data and, with the assistance of a supervisor, planned appropriate goals and implemented programs to enhance students' learning needs. There was no control placed on which goals were selected; but goals were selected according to pupil need. Therefore, students in the control group could (and did) receive help in semantic and syntactic cues but would not receive the specific treatment activity to teach these skills. Likewise the children in the experimental group could also receive additional practice with semantics, syntax, or cloze passages if it was determined that these were the skill needs.

**Materials** The teaching activity consisted of four parts. The first three parts were referred to as the *three paragraph activity* which was followed by a cloze passage. To develop each teaching activity, passages were selected from the Holt, Rinehart, Winston (1977) basal series at the second, third and fourth-grade levels. Each selection was divided into a 250-word passage taken from the "middle" of the story and the

three preceding paragraphs. These three paragraphs were used to develop the following activities:

are better able to predict what an unfamiliar word might be since they are accustomed to using semantic and syntactic cues and would then need to look only for phonic cues to confirm the "guess." Scheneyer (1965) found that students make use of context cues when they are provided with feedback on the accuracy of choices for cloze passages and the opportunity to verbalize reasons for choices.

These descriptions and findings lead to several research questions. Can poor readers be trained to increase their use of semantic and syntactic cues? Will specific training develop flexibility in the use of several cues based on meaning information? Will increased and efficient use of semantic, syntactic and self-correction cues effect the nature of miscues and reading for meaning?

**Research Design** A pretest—posttest control group experimental design was employed. The time of the sessions and the amount of sessions per student were held constant across both groups. Each tutor of both groups received equal conference time with the supervisor. All tutoring sessions were held under the same conditions, e.g., size of tutoring rooms, amount of observation time. All children were enrolled in the after school reading program which met two days a week for one hour each session.

- A. Sentences were selected from the first paragraph to provide practice in syntactic paraphrasing.  
e.g., Sally hit the ball. The ball was hit by Sally.  
Sally was hit by the ball.  
Sally was hit ball by.

- B. Phrases or short sentences which provided practice of the semantic and syntactic cues of plurals, adverbs and adjectives, and prepositions were selected from the second paragraph.

e.g., She then climbed up \_\_\_\_\_ ladder to reach  
(this, these, shoe)  
all \_\_\_\_\_ apples that were on \_\_\_\_\_  
(the, drop, these)  
tree.

- C. The third paragraph was used to provide a forced-choice cloze passage with every fifth word deleted and a set of words to be chosen for the deleted word. The choices for these words were: correct word, incorrect word but same from of speech, or incorrect word and different part of speech.

e.g., She then climbed up \_\_\_\_\_ ladder to reach  
(this, these, shoe)  
all \_\_\_\_\_ apples that were on \_\_\_\_\_  
(carry, that, those) (the, drop, these)  
tree.

These activities were followed with the 250-word cloze passage which had the first and last sentence intact and every fifth word deleted in the remainder of the passage. No words were provided as choices for the deleted words. With each of these activities, the tutor followed the script to provide immediate feedback on the accuracy of the responses, encourage "guessing for what makes sense," demonstrate models of meaningful answers and elicit verbalization by the student to explain the "guess."

## Analysis of the Data

A one way analysis of covariance was conducted on a selected number of variables. The posttest scores were ad-

justed on the basis of the covariate (pretest) to control statistically any initial differences on the pretests which might confound the posttest differences between the two groups of students. It was found from the pretest data that several students in the experimental group scored at the lower limits of the reading test scores which made the groups different rather than equivalent.

**Results** Analysis of the descriptive data indicated that there was great variability among the entry performance of the remedial readers. We found that the poor readers in our sample differed from each other in their use of various cue systems without any discernible pattern of characteristics of poor readers. For example, the range of use of self-corrections varied from 0-44%, semantic cues use varied from 0-44%, syntax use varied from 25-75%, graphic cues use varied from 15-17%, and phonic cues use varied from 25-75%.

The results of the statistical analysis indicated no significant differences ( $p < .05$ ) in performance across the Miscue Inventory or Gilmore variables. The groups did not perform statistically different as a result of direct instruction in the selected areas. Both groups made significant gains on selected variables within each group as determined by individual *t*-tests; the experimental group made greater gains in raw score and percentiles than the control group but the between group analysis indicated that the "greater gains" were not great enough to produce significant gains at the .05 level.

Trends toward significance on two variables were found which seem to warrant further investigation. These two variables were on the Reading Miscues Inventory, and under the categories of: use of semantic cues and use of meaningful self-corrections. For semantic cues, the *F* value was 1.796, *df* /17,  $p = .19$  which indicated that 4 out of 5 times the use of semantic cues increased because of the treatment. Comparing the means on pretest and posttest change, the experimental group moved from the 50%ile to 75%ile while the control group changed from the 52%ile to the 65%ile. The direction of change was positive for both groups but the treatment group did better. With the use of meaningful self-corrections, computed *F* values was 1.855, *df* 1/17,  $p = .19$  which indicated that 4 out of 5 times the use of meaningful self-corrections increased as a result of the treatment. A comparison of the means on pretest and posttest change showed that the experimental group moved from the 9%ile to the 30%ile while the control group went from the 18%ile to the 22%ile. Again the direction of change was positive for both groups but the treatment group made a greater gain.

### Conclusions and Recommendations

The trends may reflect regression toward the mean by the lower scoring readers in the experimental group. Also, the group were not statistically accounted for by the treatment. The treatment of the experimental group may not have been different enough to differentiate its effect on performance. The trends may reflect regression toward the mean by the lower scoring readers in the experimental group. Also, the children in the control group who scored somewhat higher on pretest data may have progressed at greater rates. Further data analysis will be conducted using multivariate analysis to determine possible effects of variables on each other and multiple discriminant analysis to determine possible predictors of high and low readers. Follow-up studies will attempt to match groups by specific criteria in addition to randomized group assignment.

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To summarize, the writers have provided three types of exercises which have potential for helping students obtain higher achievement levels in comprehension than those who may not have been guided to the point of error.

## REACTION: TEACHING DISABLED STUDENTS TO READ

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Victoria J. Risko and Paul S. Redelheim present a refreshing series of procedures designed to enhance reading comprehension. They report the results of a study made to ascertain the value of three types of teaching strategies as avenues for increasing reading comprehension. The strategies employed were syntactic paraphrasing; semantic and syntactic cues of plurals, adverbs, and adjectives and prepositions; and forced-choice cloze procedure.

Reported preparation of teachers in terms of both diagnosis and methodology appears to be adequate. Examples given to illustrate means of developing each teaching activity may well serve as models for the development of teacher-made materials to be used in various content lessons.

Supportive research for the experiment included 25 studies. As the review progressed, several questions emerged which formed a base for this investigation.

Subjects were selected from the fifth grade level under the assumption that these children have been introduced to the various methods of word attack. All children had been recommended for remediation in reading.

The design of the research was well-planned and includes the generally accepted components, such as (1) randomly assigning subjects to all treatments, (2) control and experimental groups randomly assigned, (3) statistical analyses used are reasonably related to measurement employed, and (4) care seems to have been exercised to limit generalizations to population of their original sample.

Even though the results of the greater gains of the experimental group over the control group were not significant at the .05 level, the combined results may have implications toward utilization of such instructional strategies with other children demonstrating deficiencies in comprehension. The results indicated that both groups made significant gains on selected variables, with the experimental group making greater gains in raw scores and percentiles than the control group.

Further investigation was suggested for two variables specified. Other conclusions to consider are that some regression toward the mean may have been reflected by lower-scorers in the experimental group. Follow-up studies are planned to include matched groups by specific criteria.

Possible suggestions for replication might include a study which specifies and includes the interactive skills mentioned in this report along with syntactic, semantic and context clues. Attention might be given to an in-depth analysis of each subject's specific needs as related to comprehension.

## THE NEED FOR A DIAGNOSTIC/PRESCRIPTIVE INSTRUCTIONAL SYSTEM

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Morehead State University is a complex regional institution in the Eastern part of Kentucky. The enrollment for the 1980-81 academic year was 7,100 students. This fall we generated about 184,000 credit hours with an FTE faculty of about 300, teaching in 152 academic programs.

There are eight universities in Kentucky. The University of Kentucky and University of Louisville are major universities, and Morehead State is one of the regional universities. All eight universities in Kentucky have open admissions for in-state students. This means that any student graduating from an accredited secondary school in Kentucky will be admitted into any of the eight institutions. However, this does not mean that a student can get into any program he desires. There is selective admission criteria in medicine, nursing, engineering, veterinary technology, and other areas.

Given the open door admissions policy of the State of Kentucky, and given the fact that the effects of economic deprivation are moderate to severe in the Eastern Kentucky region, we must be concerned about the identification of strengths and weaknesses of each individual student who enters Morehead State University. Because of the severe economic deprivation in homes, families, and school systems, a higher incident of developmental lag is evidenced in reading ability, mathematics skills, written composition skills, and communication or speech patterns among high school seniors, than is average across the country. Based on ACT scores of each individual student, standardized tests of achievement, diagnostic tests in mathematics, reading, and compositional practice, it is reliably estimated that 30-35% of our entering freshmen and transfers have at least moderate developmental lag. If we were to define developmental lag, we would characterize the behaviors to be below the 25th percentile on standardized tests of reading and mathematics abilities. Some of the most difficult data to handle reflects reading levels of the second, or third grade level, and basic inequalities in computation and concepts of mathematics. Our research conclusions indicate that where there is developmental lag, it is multidimensional. If it is in reading, it is also in math and writing skills as well.

As you would expect, attrition in the student population has been very high at Morehead State University until recently. Our data, which we are using to analyze the past situation, has been very poor. We have not clearly separated out determining variables such as two-year students from four-year students, and we have some difficulty in identifying stopouts and other characteristics. We still are talking about a student dropping out for a semester instead of perceiving him as transferring for a semester. Students should be perceived as coming and going and matriculating. Our data does show that our retention of undergraduate students from 1975-1979 was in the neighborhood of 32%. This means that 68% of the names of entering students in 1975 were not among the graduating class in 1979. Nineteen percent of dropout students came back to MSU to continue their education. There are some indicators to infer that our retention for four-year students is about 42-45%.



Confronted with the serious impact on freshmen classes by students with serious developmental lag, faculty have been fearful about the effect of "flunking out" students who are apparently unable to compete in the college curricula. Many faculty feel that standards should give way to continuous employment contracts. The State of Kentucky gave us \$17,000; we used it to fund a position in developmental reading. This became a hard money position after one year. We wrote a proposal for Strengthening Developing Institutions Program grant and were funded. Our total expenditure in our developmental model is about \$1,400,000.

## A MODEL FOR INDIVIDUALIZING THE ACADEMIC PROGRAM

WANDA D. BIGHAM  
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During the late 1970s, several indicators caused Morehead State University faculty and administrators to become concerned about its students' academic success and retention. Among these indicators were:

1. Between 1973 and 1978 the mean ACT composite score of entering students declined from 18.1 to 15.9.
2. During the 1977-78 academic year, 49% of new freshmen had composite ACT scores in the range of 1-15 and 5% scored in the range of 26-36.
3. Graphs comparing total enrollment based on the number of students enrolled and on full-time equivalency (FTE = 16 credit hours) for the period from 1973 to 1979 indicated a general increase in headcount through 1978 although FTE had peaked in 1975.
4. Follow up reports after four years indicated that in 1973 to 1975, the percentages of freshmen who did not enroll for the sophomore year were, respectively, 54, 50, and 59%. The graduation rate after four years was 30 to 31%.
5. Achievement tests administered to 378 sophomore and junior applicants for the Teacher Education Program produced the following mean scores: reading, 12.4 grade level; mathematics, 11.3; and language, 11.5.

Because of several concerns (that both the gifted and the academically deficient students had needs which were not being met, that academic standards needed to be maintained or improved, and that the threat of declining enrollment could be offset by improving retention) it was determined that an individualized academic system would be implemented at Morehead State University.

Although the university had programs serving small groups of students identified as academically talented, probationary, or academically and economically disadvantaged, it was apparent in the data that large numbers of students needed special attention in order to reach their educational goals. For this reason, it was determined that a *system* rather than a *program* would be implemented. Using this approach, most of the faculty will be oriented and involved in the process of improving undergraduate education and services. In selected departments, basic skills and advanced courses will be developed, and the faculty who teach those courses will be assigned to and hold rank in the appropriate academic departments. The responsibility for coordination of the University's efforts to individualize the academic program rests with the Director of Instructional Systems who reports to

the Vice President for Academic Affairs. Components of the system, which are described briefly below are: (1) the instructional system for individual differences; (2) the advising system; (3) the learning system; and (4) counseling services.

### Instructional System for Individual Differences

The instructional system is responsible for identifying needs and implementing courses which will individualize the academic program for our entering students. Initially, our emphasis has been placed on the development of basic skills courses because remediation of academic deficiencies has been identified as our students' greatest need. In the future, we expect to expand our offerings for the gifted and talented. Although some in this category are presently involved in the academic honors program, we believe it is necessary to do a better job of identifying and encouraging those who have creative as well as academic talents.

During the 1980-81 academic year, basic skills offerings include developmental reading, two courses comparable to two years of high school algebra, a five-day composition course, and a study skills course. Plans for the 1981-82 academic year call for the development of a pre-college composition course and auxiliary writing labs to supplement either that course or the regular composition course. In addition, it is our hope that a speech correctionist will be employed to assist in the screening an instruction regarding clear speech patterns.

Criteria for placement at the various levels of skill development in mathematics, reading, and written composition have been determined by personnel in those specific areas with input from the Directors of Testing and Instructional Systems, the Developmental Studies Advisory Committee, and the Vice President for Academic Affairs. In each case, multiple criteria (e.g., ACT scores, high school grades, self-assessment of skills, inventories, and proposed programs of study) are used by advisors to determine placement.

### Advising System

Once the courses have been developed and placement criteria have been determined, the key to individualizing the academic programs is an effective advising system. Because advising has traditionally been identified as the prerogative of the faculty and because school administrators and faculty consider this an important part of their responsibility, an expanded faculty advising system, rather than a center, has been implemented. Department chairpersons who have been oriented to the system and to the high priority to be placed on good advising, select faculty members to advise. These individuals and other interested individuals—department chairpersons, school deans, and academic counselors—meet periodically for training regarding advising responsibilities, advising techniques, and placement criteria.

Outstanding advisors from each school have been identified to receive reassigned time and special instructions regarding the advising of "undeclared" students. Students who are undecided about a major are assisted in the selection of courses which are of interest and/or which satisfy general education requirements. Initially, they were assured that it is all right to be "undeclared," and they are offered assistance with the development of educational goals.

In order for advisors to perform their duties in a responsible manner, it is necessary that they have timely and accurate information regarding their advisees. Therefore, an essential component to the success of this effort is the development of an information system for the advising and

monitoring of all our students. In addition to assisting advisors and students in the development of class schedules, the system facilitates closer supervision of those students classified as high risk due to skill deficiencies or other factors.

### **The Learning System**

The purpose of the learning system is to provide alternative strategies for instruction. This effort is being carried out in learning labs, both centralized and in selected departments, and through diversification of classroom materials and teaching styles.

The centralized and departmental labs provide a variety of materials which may be used to reinforce or supplement classroom instruction. Included are audio-visual and auto-tutorial packages, a variety of printed materials, programmed texts, and computer-assisted instruction which may be used independently or in combination with assistance from peer tutors or lab instructors.

Opportunities for faculty developed classroom materials and diversified teaching methods are provided through the Faculty Fellowship Program. Reassigned time, consultant assistance, and small supplementary budgets are available to faculty members who compete successfully through proposals which identify instructional problems and which outline acceptable solutions. Through this procedure 22 proposals affecting the same number of classes in six departments have been funded since January 1980. In addition to the worth of these projects to the students in those classrooms, there has been a valuable spin-off effect as faculty have not only received an opportunity to develop materials of interest to them but have also gained recognition and praise for their efforts.

### **Counseling Services**

Although Morehead State University is in the early stages of developing a counseling center which will include both therapeutic and informational counseling, it is important to note that the plan for all counseling services—through dormitory personnel, advisors, and academic counselors—is seen as an integral part of a system which individualizes the college experience. Because research indicates that the combination of counseling and remediation is more effective than remediation alone, a close working relationship between personnel who provide counseling and those who teach developmental courses is being developed. Although we give a high priority to this combination of services, we expect a similar concern to exist on an individual basis between counseling personnel and any advisor, instructor, or dormitory staff member who observes that a student is experiencing problems.

Sensitivity to the total student and his or her cognitive and affective needs, motivational factors, personal problems, past experiences in educational settings, and environmental factors will, we believe, result in more productive, better integrated, and better satisfied individuals.

remedial. It is developmental in that several of the students in the classes are not retarded readers, but they are there to improve their reading ability. It is remedial in that a greater number of the students are retarded readers and must be retaught the reading skills they have not mastered. The greater number of students presently enrolled in the course would score at or below the 9th grade level on the Nelson Denny Reading Test and have obtained a composite score of 14 or less on the A.C.T. There are a few students in the classes that would score in the 90th percentile on either of these tests. The individualized approach lends itself to meeting the needs of the students at all levels.

In an attempt to identify students who need help in reading if they are to have a measure of success in college courses, the University has established criteria for placement in Developmental Reading. If the student has a G.P.A. of 2.4 to 3.1 and an A.C.T. composite of 14 or below, or a high school G.P.A. of 2.3 or below, it is strongly urged that he be advised to enroll in the course. In instances where this data is not available, the student is required to take the Nelson Denny Reading Test. If he obtains a score of 9th grade or below, he is urged to enroll in the reading course.

In addition to those students who are identified as retarded readers, some programs such as pre-med, and pre-nursing require the Developmental Reading course. Also, students may on their own volition enroll for self improvement.

There are 14 sections of Developmental Reading being taught this semester. The students meet on a regular schedule of two hours one week and three hours the next week for the entire semester. The enrollment is limited to 15 per class where practical. There are three classes that have exceeded that number this semester, but no class has more than 19 students.

There are seven faculty members teaching in the program. Three have earned doctorates and two others are presently enrolled in the doctoral program at the University of Kentucky. All seven faculty members have completed advanced courses in reading, and three of the seven have taught on the secondary level. The faculty members also teach methods courses in reading in addition to their assignments in Developmental Reading.

Diagnostic procedures are begun the first day of class. This year the California Achievement Test is being used. The California Locator Tests were first administered to determine which level test was to be given. This was done in an attempt to avoid frustration for the weaker students and give some challenge to the stronger students. The students were then given the C.A.T. on either level 17, 18, or 19, depending on their score on the Locator Test. Level 17 is intended for grades 6.6-7.9, level 18 for 7.6-9.9, and 19 for 9.6-12.9. An item analysis was done in order to identify the specific areas of strengths and weaknesses of each student.

The student, in a one-on-one conference, was made aware of his performance on the test. A contract was made and the student placed in material that was deemed most appropriate. A wide range and variety of material is available in the Reading Center, but there is a heavy reliance on workbooks and kits. The materials relied on most heavily are *Word Clues* by EDL, *Specific Skills Series* by Barnell Loft, *Increasing Reading Efficiency* by Holt, Rinehart, and Winston, *Times Readings* by Jamestown Publishers. Machines, such as the Controlled Reader are used, but primarily for motivation.

In an attempt to determine the student's perception of the University, and in particular the reading course, an attitude scale was developed. This instrument was administered in the fall and spring semesters of 1979-80. Results obtained on this instrument indicated that the students have a positive attitude toward the University and toward their reading course. A vast majority, 85% of the students indicated that they would

## AN INDIVIDUALIZED READING PROGRAM FOR COLLEGE STUDENTS

**WILLIAM C. HAMPTON**  
Morehead State University

Individualized reading instruction is provided for college students at Morehead State University in a course called Developmental Reading. Even though the course is called Developmental Reading it is both developmental and

recommend Developmental Reading to their friends. Sixty-six percent of the students indicated that the course helped them to take reading more seriously.

New materials and approaches are currently being tried as the search continues to make the course more effective.

## RESEARCH COMPONENT OF THE MOREHEAD STATE UNIVERSITY DEVELOPMENTAL STUDIES PROGRAM

LINDA A. HIGGINBOTHAM  
Morehead State University

This section of the related Morehead program papers is composed of four primary areas: (1) the extent of academic deficiencies of entering students, (2) the characteristics of students taking reading classes, (3) the pre- and post-test results of students in reading classes, and (4) the grade point average of these students and its relationship to continuous enrollment.

### Extent of Academic Deficiencies

Students having an ACT composite score or an individual area score at or below 12 are described as being academically deficient. The University receives additional funding from the Kentucky Council on Higher Education for students admitted with ACT composite scores of 12 or below—259 students for the 1979-80 school year.

Inspection of the data indicate that 24% of the Fall 1979 entering students for whom ACT scores were available were academically deficient in English, 47% were deficient in mathematics, and 46% were deficient in reading. As would be expected, a higher proportion of students with ACT composite scores of 12 or below were academically deficient while lower proportions of students with ACT composite scores above 12 were deficient. The following deficiency percentages were recorded for students ( $N = 730$ ) with composite ACTs above 12: English, 65, 9%; mathematics, 229, 31%; reading, 216, 30%. Combining all ACTs produced the following percentage deficiency pools: English, 241, 24%; mathematics, 460, 47%; reading, 455, 46%.

An examination of multiple areas of academic deficiencies may provide a better indication of the extent of deficiencies for the 1979-80 entering student population reporting ACT scores (see Figure 1). Of students with ACT composite scores of 12 or below, 54 percent were academically deficient in all three areas (English, mathematics, and reading) and 27 percent in two areas (mathematics and reading). The extent of academic deficiency for students with ACT composite scores over 12 was 32 percent in mathematics only, 28 percent in reading only, and 23 percent in both of these areas.

### Student Characteristics

For the fall semester of 1979, 209 students enrolled in Reading I classes and 15 students enrolled in Reading II classes. In the spring semester of 1979, Reading I had 67 students and Reading II had 42 students. Most of the students in Reading I and Reading II classes for fall and spring semesters of 1979 were freshmen, 18 years of age, white, resided in Kentucky, and came from numerous feeder high schools. The sex distribution was about equal for females and males. All six colleges of the institution had majors enrolled in reading classes.

### Pre- and Post-Test Results

Completed pre- and post-test scores were available and are as follows:

80% +	Fall 1979 Reading I
47% +	Fall 1979 Reading II
69% +	Spring 1979 Reading I
90% +	Spring 1979 Reading II

Although complete test scores on the reading students were much lower than desired, overall attendance was good. The average number of days absent for each group was four.

Statistically significant gains between pretest and posttest scores were found when  $t$  tests were computed for students in Reading I classes for the Fall 1979 semester on the easy ( $t = -8.49, p < .01$ ) and hard ( $t = -9.82, p < .01$ ) passages of the reading rate scores, skimming and scanning scores ( $t = 8.25, p < .01$ ) and total scores ( $t = 6.02, p < .01$ ) on the McGraw-Hill Basic Skills (standard scores with a mean of 50 and standard deviation of 10). For the Reading II students, gains were evident on both reading rate scores and retention scores: easy,  $t = 2.83, p = .025$ ; hard,  $t = 3.65, p = .008$ ; and retention,  $t = 2.57, p = .037$ . Skimming and scanning, paragraph comprehension and total score were non-significant.

The  $t$ -test results from the pre- and post-test scores on the California Achievement Test (Level 19, grade equivalent scores) for students taking Reading I and II classes during the Spring 1979 semester were computed and found to show significant differences. Significant gains were found for Reading I ( $N = 46$ ) students on vocabulary scores ( $X_1 = 10.6, X_2 = 11.3, t = 2.61, p = .012$ ); comprehension ( $X_1 = 10.0, X_2 = 10.9, t = 4.49, p = .001$ ); and reference ( $X_1 = 10.5, X_2 = 11.1, t = -2.74, p = .009$ ). Significant gains were found for Reading II students ( $N = 38$ ) on vocabulary grade equivalent scores ( $X_1 = 8.7, X_2 = 9.8, t = -3.09, p = .004$ ); comprehension ( $X_1 = 8.13, X_2 = 9.5, t = -3.38, p = .002$ ); and reference ( $X_1 = 10.00, X_2 = 10.8, t = 2.76, p = .009$ ).

### Continuous Enrollment

The current and cumulative grade point averages for students in the Fall 1979 Reading classes and the grade point averages of these students the following Spring 1979 semester are revealed in Table 1. Also included are the current and cumulative grade point averages of the students in the Spring 1979 Reading classes as well as their previous semester grade point averages. The current and cumulative grade point averages for all four groups of students over the two semesters were above the probation level of 1.50 GPA.

Sixty percent (126 out of 209) of the students enrolled in Fall 1979 Reading I classes and 53% (8 out of 15) of the students in the Fall 1979 Reading II class enrolled at Morehead State University one year later for the Fall 1980 semester. Note that the Fall 1979 Reading II class only consisted of 15 students and one of these students graduated Fall semester. Fifty-five percent (37 out of 67) of the students taking Reading I classes during the Spring 1980 semester enrolled at Morehead State University for the Fall 1980 semester. Of the students who took Reading II classes in the Spring 1979 semester, 81% (34 out of 42) enrolled at Morehead State University for the Fall 1980 semester.

Preliminary evaluation of the reading classes indicates that participation in the program apparently has beneficial results in helping to overcome developmental lag. Continuous monitoring of the program is planned.

Table 1

Student GPA'S For Fall 1979 And Spring 1979 Semesters  
And Enrollment In Fall 1980 Semester

	FALL 1979		SPRING 1979		FALL 1980	
	Current GPA	Cumulat. GPA	Current GPA	Cumulat. GPA	Enrolled	
READ I (1791)	X = 2.02 n = 209	X = 2.02 n = 209	X = 1.98 n = 173	X = 2.17 n = 173	Not at MSU	83 (40%)
READ II (1792)	X = 2.44 n = 15	X = 2.51 n = 15	X = 2.32 n = 12	X = 2.53 n = 12	At MSU	126 (60%)
					Not at MSU	6 (40%)
					At MSU	8 (53%)
					Graduated	1 ( 7%)
READ I (2791)	X = 1.84 n = 45	X = 1.88 n = 48	X = 1.78 n = 67	X = 1.73 n = 67	Not at MSU	29 (43%)
					At MSU	37 (55%)
					Graduated	1 ( 2%)
READ II (2792)	X = 2.08 n = 41	X = 2.03 n = 41	X = 2.10 n = 42	X = 2.04 n = 42	Not at MSU	8 (19%)
					At MSU	34 (81%)

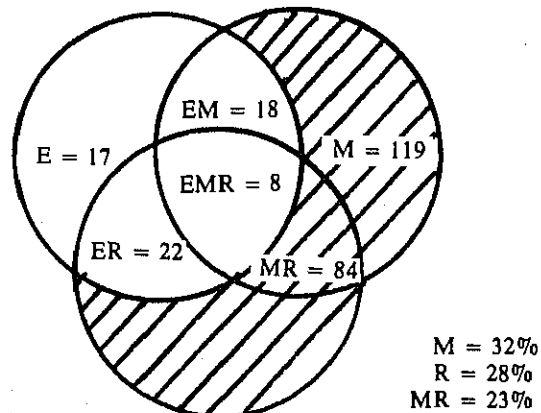
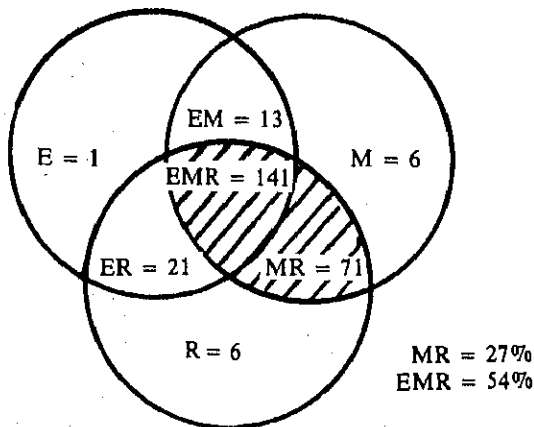


Figure 1. Students with Academic Deficiencies When ACT  
Composite Scores Were Split at 12.  
E = English, M = Mathematics, R = Reading  
DS = Developmental Studies

# THE DIAGNOSTIC PRESCRIPTIVE INFORMATION SYSTEM MODEL FUNDED BY TITLE III UNDER THE STRENGTHENING DEVELOPING INSTITUTIONS PROGRAM

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Research indicates that persistence in college is viewed as a function of the degree of harmony between the student and institution's environment (Cope & Hannah, 1975). More specifically, if a student is fully integrated into the social and academic systems of a college or university, then presumably that student will have more positive perceptions of the institution's environment, participate more extensively in social activities, and perform at a higher level of academic achievement (Tinto, 1975). Research on student retention indicates that attrition is heaviest during the freshman year (Eckland, 1964; Marsh, 1966; Rootment, 1974). Since 1970, Morehead State has, through various projects, addressed the problems of identifying and advising high risk students, that is students most likely to drop out. These projects, however, were limited to serving a minimal number of students. Since Morehead State University is, by legislative action, an open-door institution, graduates of accredited Kentucky high schools must be accepted without examination or exception. The result has been that a large number of academically deficient students have been enrolled.

The steady decrease in academic competence (as measured by the decline at the institution in the composite ACT scores for entering freshmen since 1973, the unfavorable comparison with national ACT mean composite scores) and the degree of economic disadvantage of the institution's clientele indicated the need for an innovative comprehensive approach which would provide complete advising and assessment coupled with developmental education programs addressed to the needs of all students.

## Content

A diagnostic prescriptive information systems model was designed and submitted for Title III funding under the Strengthening Developing Institutions Program. In October, 1979, Morehead State University was awarded a four year grant. During 1980, the four subsystems in the model have been in the planning and implementation stages. These subsystems include: (1) developmental studies system which consists of reading, written composition, mathematics, and oral communication, (2) learning systems, (3) advising systems, and (4) an information feedback system for evaluation purposes.

Although evaluation has been ongoing, the statistical analysis data is merely preliminary at this time. The effect, however, of the 1979 planning and implementation year centers around awareness. Although developmental classes in reading and written composition were offered in earlier years, services were limited. During the past year, the awareness of the value of these programs has increased.

Research studies have shown that effective reading is necessary in order for any person to succeed in college. It is difficult when students must read to learn but have not learned to read. Developmental reading on the higher level has been and still is on the defensive. Reading is an integral part of the broader educational program and should share the responsibility for communicative development. Courses in English, social studies, science and mathematics require a student to spend much time applying study skills in reading textbooks, references, and related materials. Hence, skillful

reading and academic success tend to go hand in hand. It must be emphasized, however, that despite Morehead State University's recognition of the necessity for corrective work, our developmental reading program (and other developmental services) on campus aim to help all students make steady progress in the sequential acquisition of reading skills. This is evident, for example, by the developmental reading course requirement (in the pre-med program curriculum).

The Morehead State University faculty is aware of the increasingly large number of high school graduates going on to college and that the demands on reading ability made by college textbooks are great. College students benefit from reading programs geared to their developmental needs because special reading skills and abilities are necessary for effective reading in particular content fields; and, basic conditions of learning through reading is important to teachers of all subjects. That is if common conditions are ignored, the more specialized reading skills cannot be soundly developed.

At Morehead State University students of varied abilities benefit from the individualized nature of the program which is geared to their various developmental needs. Students with their advisors often follow-up the basic reading course with Developmental Reading II. Subtle implications of impact of the developmental reading program is displayed by the high retention rate of students who completed the program—approximately 83%. Total campus increased from five in the fall of 1978-79 to 15 in the fall of 1979-80 and from five in the spring of 1978-79 to nine in the spring of 1980. In 1980-81, a total of 28 courses (Developmental Reading I and II) were offered in the fall and 22 courses in the spring. Enrollment in the classes as reflected in spring 1981 pre-registration show 60 students enrolling for Developmental Reading I and 53 enrolling for Developmental Reading II for a total of 113. (Maximum 15 students each class.) After the fall semester of 1980-81, 54 students were identified as needing to initially enroll in a reading class. Sixty-seven students were identified as needing additional skill development. It is expected that the pre-registration spring enrollment figures of 113 for Developmental Reading will reflect the placement of a number of the 121 identified students as needing the course. This indicates advisor awareness, student satisfaction, and program impact across campus.

The Department of Mathematics, and Languages and Literature have expanded developmental work in the areas of written composition, and the Department of Communication in the area of normal or clear speech patterns. These efforts indicate support for and continuation of the developmental movement on campus. The concerted efforts of these departments to provide comprehensive programs for building skills displays the general concern of both faculty and administration for focusing on individual needs, self-paced individual achievements, for adjusting instruction to the student's mode of learning and specific skill needs. Teachers and advisors seek to provide the opportunity for students to acquire needed skills and to achieve individual goals. It is believed these will lead to the satisfaction, extension, and enrichment of students' interests and personal and social development. A flexible, continuous and comprehensive developmental studies system encompassing diagnosis and remediation in the major academic areas is apparent by developing on campus.

The faculty of mathematics has supported the contention that many of the failures in mathematics are caused by the inability of students to read and understand mathematical discussions as well as problems and exercises. After identifying entry level competencies of prospective students in mathematics, the faculty has developed and implemented, in



the past year, a developmental studies program for those students needing assistance in algebra. A self-assessment profile sheet involving attitude, background, and ACT score in mathematics to assist the student and advisor in selecting the proper course in mathematics was utilized upon initial advising contact. This profile, has assisted in the prevention of mistakes in under-placement as well as over-placement. General mathematics and computational courses also have been developed to meet the needs of students who need remedial work in arithmetic.

The model which this department has chosen for the developmental classes in developmental mathematics involves the following ideas. A computer assisted learning laboratory in which modules in beginning and intermediate algebra has been made available for use by students. Students follow a self-paced approach using softback consumable exercises and tests. Assistance is given by an instructor, by peer tutors, and by the tutor laboratory. Microcomputers also are available. Assistance has been available to students from 9:10 a.m.-3:00 p.m. during the day, and several hours each evening.

Students usually work in pairs at the microcomputers. The microcomputer is chosen for its graphics capability and reliability. Computer programs which combine instruction in technique with practice have been developed. The anticipated goals include speed of problem presentation, active involvement by the student in the teaching-learning process, avoidance of intimidation by a person whose skills greatly exceed those of the student, repetition of instruction without impatience, motivation of the student by animation, and assured activity in the instruction process. The progress of each pair of students is monitored daily and made available to the instructor; thus, the instructor has information concerning the progress of every student.

Entrance and exit into these courses may occur at varying times during a semester. Based upon the results of a pre-test and post-test, a continuous program is outlined for students determining the prescribed modules and time requirements for completing the course. The results of the post-test is analyzed statistically to determine the effectiveness of the program. Records to track students' progress is kept by computer.

During the past semester, approximately 250 students were identified with a limited 200 students being served in the developmental mathematics classes. This included variable entry which added two class sections. Continuous counseling of student progress was necessary, and an in-progress grade was given if a student failed to complete the course within a particular semester. Preliminary figures indicated a 10% attrition rate for the students enrolled in the developmental mathematics classes.

It is possible for a student to complete both courses during a single semester. However, this sort of progress is rare, perhaps due to a lack of motivation and/or the newness of this type of instruction. Scales to measure attitude and motivation in the self-paced programs are being developed.

Although the written composition faculty efforts were initiated some years ago they have now developed plans for change. A proposed course of action will include the implementation of a basic writing skills course which will become part of the University's developmental studies system. This will replace the remedial component of the present English class. The rationale for the new course is different. The course will cover somewhat different material than was previously emphasized and will cover it with thoroughness. Placement will be determined on the basis of ACT scores and/or performance on the Morehead State University Written Composition Test, developed locally. Flexible

placement will be possible. This course will carry three hours of elective credit, but these hours will not satisfy the General Education requirement in written composition.

The course is designed for the student who is not sufficiently prepared to enter the usual college English Composition course. Major emphasis is on writing and revision. Grammar, punctuation, and mechanics will be reviewed but such a review will not be the main component of the course. Reading assignments are used to build both active and recognition vocabularies and to improve the skills of critical reading and written response. Laboratory assistance as in the case of reading and mathematics also is available. The exit requirements are the satisfactory command of grammar and mechanics; ability to compose satisfactory paragraphs according to recognized patterns of development.

The Teacher Education Council, the Department of Education, the Department of Communication, in the area of speech has developed a program to assess students in normal and clear speech patterns. This program has not yet been implemented. However, it is recommended that every teacher education candidate be required to take the Teacher Education-Speech Screening Test and three hours of Speech unless exempted from enrolling in a speech class. Each candidate will be administered the examination during in-class sessions of Education Foundations. The examining panel will consist of a speech therapist and two of the speech instructors and the examination will normally take two class hours. Students will be tested in terms of listening, voice production, and oral organization/clarity.

In summary, a definite faculty awareness of developmental needs exists at Morehead State. The faculty has made provisions and has adjusted programs to deal with difference in rates of learning, and to assist each student to develop a pattern of learning that is individually appropriate and beneficial. The subsystem described as "Learning Systems" provides an opportunity for the faculty to develop instructional innovations made available through reassigned time and faculty fellowships. Motivation is apparent and through this opportunity faculty is developing innovative programs and courses designed to meet individualized student needs. Efforts include the development and adjustment of present materials and methods to fit students' learning modes. Proposals have been received from all departments including science, mathematics, computer programming, English composition, special education, and psychology. Quick assistance modules are available for students entering advanced classes.

Faculty has become more aware of the importance of advisement as exemplified by the coordination of efforts to identify students with specific needs, to make special placement, to track and monitor student progress, and refer to appropriate support services.

There is a need to develop a system that allows faculty to do advising activities well and the advising system has been developing a design that will allow advisors to have more positive impact on the development of the student experiencing difficulties. An advisor has the option of making appropriate referrals to the student support system which includes such special units as counseling, career planning, study skills, cooperative education and, learning laboratory assistance. All of these units show evidence of increased use.

The advising system also is making progress in providing opportunities for students to select and plan their education programs, evaluate their own progress, and to identify their own special learning needs. Efforts are being made to maintain an appropriate balance in each group without one area taking precedence over another. It has been determined that the impact on the majority of faculty across campus as to

the goals of developmental advising will require multiple approaches over a period of time. However, the efforts which have been made to disseminate useful material and involve faculty in the decision making progress has been successful. On-going faculty advising committees have been formed and are actively addressing concerns such as philosophy, accountability, reward system, policies, training, information flow, student orientation, continued evaluation, manual information, ACT results, faculty and student needs.

The fourth subsystem is that of information feedback. This includes evaluation which presently deals with (1) academic deficiencies; (2) determination of needs; (3) advising survey; (4) development of student data files; (5) evaluation in content areas; and (6) preliminary retention data. Evaluation continues to document impact. Effective communication flow across campus is also addressed in the feedback system.

An additional impact has been the assistance of consultants. Consultants have provided an important diverse view of campus activities. As a result, modifications have been suggested from a distinctively different point of view. Workshops on the development of instructional modules, library skills courses, etc. gave opportunity for all to become involved and, increased campus awareness. These workshops were very successful indicated by high faculty attendance. Hence, some of the workshops were sometimes unprepared to accommodate the large unexpected numbers.

The total developmental effort on campus has made a significant awareness impact. Much of the campus has been re-acquainted with the emphasis that must be placed on the concept that learning is a process as opposed to a subject oriented approach. Active involvement has been evident and consequently progress has been significant.

## **REACTION: THE MOREHEAD STATE UNIVERSITY PROGRAM**

**ALBERT J. KINGSTON**  
The University of Georgia

The Morehead State University program to overcome educational developmental lag described in this symposium is not only bold but probably is unique. Remedial programs in reading, English, and mathematics have been around for a long time. Recently, there has been a flurry in prestigious universities to organize so-called special studies programs to assist minority and culturally disadvantaged students adjust to the demands of the university. At Morehead State, however, the entire university seems to have been mobilized to achieve the desired goals.

White's paper describes the necessity for individualizing a university's offerings to better meet the needs of Appalachian students. Bigham presents a system, now operating, which encompasses the vision and hopes for restructuring a whole university, with all its diversity, in order to individualize the educational experiences of entering students. Often we hear administrators and faculty decry entrance standards and wish for more rigorous selection criteria. What is exciting at Morehead is a willingness to accept open admission and to honestly and forthrightly deal with it. In many universities compromises are made and new departments or units are organized and staffed by student oriented personnel whose sole mission is to assist the less than able student. It is significant at Morehead that the academic departments play a central role in adjusting academic offerings. It is even more interesting when we note that the English department and the mathematics department, units not generally regarded as demonstrating flexibility, have taken leading roles.

Hampton describes a college reading program that is not too dissimilar from others. It is organized as a course. As such it has limitations. Students seek grades, they tend to equate it with other course offerings and expect to put in just so many hours of work. The Morehead group have attempted to modify the restrictions imposed by having administrators view it as a course. Provisions are available for the student to re-enroll in another course should he make less than optimal progress. Class size also is restricted. Hampton failed to mention grading problems; a thorny issue in college-adult reading. One positive aspect of the Morehead program is that non-retarded students, i.e. pre-med and science majors enroll in reading. This policy may go a long way in preventing the courses from being stereotyped as "dummy" ones.

As seven different teachers handle sections there undoubtedly are some differences in attitudes toward and interest in the program. As the teachers also teach pre-service and in-service teachers there may be some who do not regard college reading as significant as these other duties. Such attitudes may show up in differences in the amount of time spent in individual conferences and special assignments with those enrolled in the reading classes. By and large the students showed positive reactions to their experiences. In the future it is suggested that the survey be made anonymous and perhaps administered by a person other than the teacher.

Blong's paper describes the important components of liaison and coordination which are basic to the efforts to involve the total university community. English and mathematics have developed good approaches to academic offerings. Little was mentioned, however, of efforts being made to help all members of the faculty to improve their teaching and advising. One gathers from Blong's discussion that to date, selected faculty, those most concerned, have developed new diagnostic and individualized approaches. It is hoped that in future reports attention is given to methods employed to spread the efforts throughout all ranks and departments. If successful, the effort and methods will be widely studied and imitated at other institutions.

As is usual in complex changes, evaluation is difficult. Higginbotham presents data which reveal the extent of the educational deprivation of entering freshmen. These data are presented in her text, and Figure 1. She devotes the balance of her report to reading. The data are fairly typical of college reading classes. Students improve significantly in rate but not significantly in comprehension. Perhaps, the new methods being developed by the reading instructors will focus more on comprehension and cognitive abilities. Probably the skill emphasis in the reading courses needs to be accompanied by massive efforts to enrich the overall cultural and informational experiences of the students.

**COMPUTER ASSISTED INSTRUCTION: AN  
INNOVATIVE APPROACH TO THE DEVELOPMENT  
OF COMPREHENSION AT THE COLLEGE  
FRESHMAN LEVEL**

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H. SAHA  
HOR-CHING WANG  
Alabama A & M University**

The "quasi-open door" admission policy at Alabama A & M University (AAMU) makes it possible for students of a variety of backgrounds to enter college. In order to satisfy its needs for accountability for those students, AAMU provides intensive support to assist the students in overcoming handicaps to educational progress. These efforts have especially

focused upon the weaknesses of freshmen students in the area of basic skills.

A large number of the students who enter under the present admission policy have not mastered the proficiency level of reading skills necessary to cope with the requirements of the college learning environment, especially with regard to reading, thinking, and study skills. For example, most of the 682 freshmen who entered the University in the Fall of 1979 needed some assistance in reading as determined by the *Nelson-Denny Reading Test*, which is used for screening purposes. Those students with weaknesses in reading were required to enroll in the Reading Course during the school year.

A major goal of the AAMU Reading Program is to correct reading and study skill deficiencies before the students are overcome by the demands of college level work.

Assistance in reading is not available to these students other than through Freshman Reading.

The Reading Program is presently operating at full classroom capacity with freshmen students currently receiving three 50-minute periods of classroom instruction per week. Because of the wide range of individual differences in cultural and experiential backgrounds, general achievement, and varied learning modalities, it is a great challenge to overcome years of accrued reading deficits. It is a fact that most students show substantial improvement by as much as two to four years growth in a single year.

Currently, instruction in the reading course is provided through the use of approximately 30 non-computerized instructional modules which have been developed to improve a variety of reading skills. These skills include: vocabulary, comprehension, critical reading, study skills and rate of comprehension.

The non-computerized modules are designed to include: a title; brief general description; statement of objectives; pre-test; text; practice exercises and post-test. Each module is designed to have three levels: Level A is prepared for the lowest level students with reading grade equivalents of 6, 7, and 8 as determined by the *Nelson-Denny Reading Test*. Level B is the middle level prepared for students with grade equivalents of 9 and 10. Level C is the highest one for students with a reading grade equivalent of 11.

Following the initial assignment to a section of Freshman Reading, each student completes background information forms, interest inventories, writes an introspective essay and has an initial conference with his/her instructor. All students are then given the *Stanford Diagnostic Test* to further diagnose strengths and weaknesses in reading. Next, each person is given an assignment sheet which lists all of the non-computerized modules which the student needs to complete in the course. The course work may extend for two semesters for some students. Upon completion of the course, each person receives a letter grade and three hours of course credit.

In a typical class session, the students enter the reading lab and remove their module assignment sheet from their activity folders. Next, they select the appropriate materials to be used in the completion of their work. Some of the modules are designed so that all of the information necessary for their completion are contained within the modules themselves. Others require workbooks, tapes, kits, machines or other resources for their successful completion. The instructor is available to help the student in locating the necessary materials, to clarify directions, and to provide any other assistance needed.

When they have selected their modules, the students then proceed to work through the activities at their own pace. Each module is designed to develop one skill, and usually requires

2-3 hours for completion. Modules which have been completed are placed in a box for the instructor to grade and return to the student. If a student has not achieved at least 70% mastery of a particular skill, he is required to work through the module again.

The present problem is that, due to large numbers of students in the classes, the instructors have limited time to work with individuals to insure that the remedial modules which they complete have been clearly understood. Those students who do not have at least 70% mastery of the modules are required to work through them a second time. During this process there is little or no constant interaction between instructors and students nor does time permit enough drill to be given until 100% mastery has been achieved. This results in some students achieving complete mastery while others achieve partial mastery of skills to be developed in the course.

It is believed that CAI modules will remedy the existing problem. With CAI, learning will be further enhanced through immediate feedback relating to appropriateness of each response. As each response is evaluated, the student advances step by step toward the mastery of skills. At each step appropriate instructions are given to the student related to his level of performance. If necessary he may be requested to do additional reading of text material or he may be referred to his instructor. Repeated drills in skill areas may be provided for those who need additional practice.

Instruction is presented in small, well-defined units which are less intimidating to students than large blocks of material.

Because of the needs of freshmen students who entered AAMU, it was decided that, rather than attempt to adapt materials which had been developed at other institutions, CAI modules appropriate to the needs of this student population would be developed.

This endeavor was undertaken as part of a three-year National Science Foundation Project at AAMU. The NSF CAUSE Grant provided for the purchase of a PDP 11/70 computer from the Digital Equipment Corporation and 12 interactive cathode ray tube terminals.

As the authors prepared to develop the initial computer assisted instructional modules in reading, it was determined that, because of the needs of the students, the best place to start was with the comprehension skills, especially the location of main ideas in paragraphs. It has stated that one of the many skills a good reader develops is the ability to recognize and understand the main idea or central thought of material he has read. The exercises in *Breaking The Reading Barrier* by Gilbert were chosen because of their previous use with AAMU students. It had been determined that these exercises were very effective in helping the students to understand main idea patterns in paragraphs.

The first CAI module was a general one in which an overview of the course and specific course objectives were given. The module included a list of the CAI modules which will eventually be available to the students in the area of comprehension.

The second module to be developed, and the focus of this research project was entitled, "Reading For the Main Idea In Paragraphs." The objective for the module was:

Upon completion of this module the student should have improved his ability to recognize and understand the central thought or main idea in paragraphs.

The module was divided into three segments, as required by standard CAI module format. In segment 1, a pre-test followed the statement of the title and objective. This test was designed to measure the student's ability to identify the main idea in a paragraph prior to completing it. Moreover, it had

been previously determined that all students needed this skill.

Segment 2 of the module contained the text. In this section, the rationale for distinguishing the main idea from supporting details was given, in addition to clues to the location of the main idea. Then an example of each of the five paragraph patterns was presented.

Segment 3 of the module was the test section in which ten paragraphs were given for practice in identifying the main idea. The number of correct responses, the number of trials and the percentage of accuracy were given for the ten paragraphs. Eighty percent mastery was considered satisfactory.

Five interested students from three of the reading classes were introduced to the CAI module which was developed. Each person sat at the terminal console and typed a response to the questions asked by the computer. The students' responses were evaluated and appropriate directions were given as they completed the three segments of the main idea module. The terminal presently available with the PDP 11/70 is of the tele-type, which required the student to read the information from a printed sheet.

A 13 item questionnaire related to the students' experience with the CAI module was developed for evaluation purposes. Each student completed this questionnaire upon completion of the module.

Although the results are not conclusive because of the small sample, the students responses provided interesting aspects of using CAI for reading skills development at the college level. The results were as follows:

Most of the students responded favorably to their learning experience with CAI and felt that there was a net gain in the ability to identify the main idea in paragraphs.

The students like the CAI module for its drill and directions for finding the correct answer.

It appears that CAI can be fruitfully used to provide individualized experience in reading skills development to supplement the classroom instruction.

Future progress will be presented after the completion of the modules in this area and their evaluation.

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## **REACTION: INNOVATIVE APPROACH TO COMPREHENSION AT THE FRESHMAN LEVEL**

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The effort to get reading CAI modules designed and tested at Alabama A & M University by Professor Thompson and his associates (described in the previous paper) is in many ways typical of such efforts at colleges and universities around the United States. One common factor is outside funding, in this case an NSF grant. A second common factor is the use of CAI to meet basic skill goals for which the college or university is held accountable by its governing body. It is also typical that the reading specialist involved in such an effort has little or no previous experience with computer-assisted instruction. Each one must be innovative.

### **Innovative programs in CAI-reading are much alike**

The sequence of events is almost always the same. The call for proposals is sent out; a proposal is drafted and mailed; funds are allocated; computers become available, and then a reading specialist is involved. Seldom is the computer or its author languages (those with which it can be programmed) determined by the reading specialist who is asked to make use of it. Consequently, the reading specialist must be familiarized with the capabilities and limitations of the computer already selected—before he or she can select or design the software to be presented and/or managed by the computer, and before he or she can investigate alternatives such as the purchase of ready-to-use CAI programs.

The choice of topics is also quite predictable. Comprehension is the major problem for college students requiring remedial reading instruction, and the most needed type is comprehension of the main idea. Shaw (1961), many years ago, maintained that Brooklyn College students' greatest reading difficulty was in stating main ideas. Banks (n.d.), in an effort paralleling Thompson's, chose as her first CAI lessons a set designed to help students learn to select main ideas for paragraphs.

Another predictable event in CAI efforts is the decision to create a drill-and-practice program. Nearly every college or university computer center has developed or purchased some one or another course-authoring program. Such a program, once called up, asks the programmer to type in (1) the passage to be read, (2) the questions to be asked, (3) the right answer, (4) several distractors or wrong answers, and (5) a reply to be printed or displayed by the computer for each right or wrong answer chosen by the student. Course-authoring programs also usually include text-editing features which enable the programmer to change answers and correct errors (debug the course) without retyping the whole section.

In the case of the CAUSE grant to AAMU, certain advance

work made it easier for Thompson and his associates to begin their tasks than it might otherwise have been. Since computer-assisted instruction is *always programmed instruction*, and since programmed instruction requires pre-stated behavioral goals, the goals developed for AAMU's reading modules could be used without change. Furthermore, the division of the course into 30 modules, of three reading levels each, also was an event that would have to have been accomplished before computerization if it had not already been done. In addition, mastery levels (80%) had been set and pretests and posttests had been developed.

Consequently, the initial CAI effort required only the development of an introductory unit including a list of the lessons among which the student is to choose (or from which the instructor may prescribe) and the various units or lessons themselves, which may be added as they are made functional. Thompson's presentation indicates that he and his associates have accomplished the first task (the introductory unit) and the second (converting their main idea module to a CAI-reading lesson) in a manner that is satisfactory to their students. It appears probable that they will go on to complete their tasks in the next two years of their funding.

### Alternatives should be explored

During the past decade a number of other colleges and universities have tried computer-based reading instruction and a great deal has been learned about it. Herlin, Bance and Hansen (1976), for example, have pointed out that their critical reading course, when computerized, was more effective for slow-moving students than for quicker ones. Kahn's (1980) investigation found that students preferring highly structured instruction benefit more from CAI-reading lessons than others who prefer less structured (and more personalized) lessons. One of the most sobering findings, however, is the tremendous amount of time required for creating, field-testing, and de-bugging computerized lessons. Mason and Blanchard (1979) reported that at one time an estimated 400 hours were required for the creation of one hour of CAI. However, Chapp and Wye (1969) estimated that only about 254 hours would be required for their production of one hour of CAI reading instruction.

With such expensive production estimates, one must wonder why the purchasing of programs is not a more-frequently chosen alternative (Mason, 1979). Several companies market CAI instruction which could be used (or modified to use) in college remedial instruction. Among these are the Computer Curriculum Corporation, the Control Data Corporation, and the Time Share Corporation. Furthermore, recent agreements between education publishers and computer manufacturers suggest that additional computerized reading programs will soon be available.

Another alternative is to try computer-management (CMI) of reading instruction for college students. Numerous colleges (Randall, 1972) and universities (Oosterhof, 1977) have done so, many with commendable success. The decision to use the computer to test, score, recommend or prescribe instruction, evaluate progress, and keep records is usually welcomed by overworked college reading instructors (who sometimes find that getting a computer-managed program started involves more recording than their usual work). However, colleges contemplating the development of their own CMI reading programs should be aware that such programs can now be purchased from companies such as Educational Progress Corporation and Learning Unlimited.

### Much remains to be done

While it is possible that AAMU (or any other college or

university initiating computer-based reading instruction) could have purchased the CAI or CMI reading programs which they decided to create themselves, it may well be that their decision will prove to be the correct one. As more colleges and universities design computer-based instruction to fit their very own needs, more knowledge is amassed and more programs are available for newcomers to choose from. With each new attempt, our technological knowledge base is expanded.

Thompson and his associates have learned much from the work they have done thus far. Perhaps the greatest benefit of their innovative project will be not the resulting CAI reading program, but rather the knowledge (about developing such programs) that his group can share with others in their own academic community, with other specialists in reading, and with others in the field of computer-based instruction. Consequently, the true value of this (and other innovative efforts) may be impossible to ascertain.

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## **USING ADVANCED ORGANIZERS IN THE CLASSROOM**

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It has been 20 years since David Ausubel (1960) published his first account of the use of advance organizers. In his latest major publication (Ausubel, Novak, & Hanesian, 1978), he finds it hard to understand the criticism of his colleagues and the lack of empirical support for the advantages of using such a strategy to promote meaningful verbal learning. Even taking into consideration the 10-year lag estimated to exist between the formulation of educational theory and basic research and applications of that theory and research in classrooms, it does seem that the use of advance organizers is long overdue.

Given the rapid rise and fall that is characteristic of many educational practices, one wonders why the concept of advance organizers is still viable. And it is viable, judging from the number of recently published journal articles, research reports, and educational texts which deal with the concept. After a brief explication of the centrality of advance organizers to Ausubel's theory of meaningful verbal learning, this paper will explore some possible reasons for the lack of empirical support and present guidelines and practical suggestions for the construction and use of advance organizers in classrooms at various age levels. According to Ausubel et al. (1978):

Meaningful reception learning involves the acquisition of new meanings. It requires both a meaningful learning set and the presentation of potentially meaningful material to the learner. The latter condition, in turn, presupposes (1) that the learning material itself can be nonarbitrarily (plausibly, sensibly, and nonrandomly) and substantively (nonverbally) related to any appropriate cognitive structure (possesses "logical" meaning) and (2) that the particular learner's cognitive structure contains relevant anchoring idea(s) to which the new materials can be related. (p. 38)

Of the two conditions set forth, Ausubel and his colleagues assert that the second, the existing structure of the learner's knowledge at the time of learning, is the more important. This is succinctly stated as follows: "If we had to reduce all of educational psychology to just one principle, we would say this: The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly" (p. 163).

Once the teacher has ascertained the state of the learner's knowledge (a difficult task to which Ausubel devotes little space), the principle teaching strategy recommended for the deliberate manipulation of the learner's cognitive structure so as to enhance meaningful verbal learning is the use of "appropriate relevant and inclusive introductory materials (organizers)" (p. 170). These organizers are to be used in advance of the learning experience in order to establish a meaningful learning set and to "bridge the gap between what the learner *already knows* and what he *needs to know* before he can meaningfully learn the task at hand" (pp. 171-172). Contrary to summaries and overviews, advance organizers should be at a higher level of abstraction, generality, and inclusiveness than the new material to be learned. This will provide the "ideational scaffolding" or superordinate ideas under which the new subordinate ideas may be subsumed.

Ausubel's theory is inherently logical. It is well established, both from empirical studies and our own knowledge of the world, that the acquisition and retention of large bodies of subject matter knowledge are impossible without the ability to abstract and classify. Lawton and Wanska (1977) stated that "it is impossible to disprove the existence of the single crucial cognitive variable in the theory—that is, stable, clear, hierarchically organized subject matter knowledge" (p. 239). It then follows that a teaching strategy (e.g., advance organizers) designed to facilitate the hierarchical structuring of knowledge should promote learning. Yet, the empirical research has failed, for the most part, to confirm this.

Barnes and Clawson (1975) reviewed 32 studies, including those by Ausubel and colleagues, and found only 12 that showed significant results in favor of the use of advance organizers. Baker (1977) analysed 52 studies *since* the early work of Ausubel; a majority of them were non-supportive. A number of investigators have proposed possible explanations. The one most frequently encountered is the lack of an operational definition of an advance organizer, one which would provide criteria and examples so that a panel of impartial judges could identify an advance organizer (Barnes & Clawson, 1975). Ausubel has been criticized for vagueness and ambiguity in terminology (Rickards, 1977) and for not

providing specific examples. In defense, Ausubel has replied that he devoted 23 pages of his 1968 publication to the nature and definition of advance organizers, including a discussion of how to construct one on a specific topic. This reviewer, as well as others (Hartley & Davis, 1976; Thelen, 1976; Vacca, 1978), has searched in vain for the "how to" discussion. General suggestions can be found, but specific examples are lacking in Ausubel's text.

However, if one reexamines Ausubel's two criteria for the presentation of potentially meaningful material, and if one remembers that the second criterion, the existing structure of the learner's cognitive structure, is the more important, it then becomes obvious that any given advance organizer can only be illustrated in terms of the cognitive gap it is designed to bridge. One may describe the building of bridges in general, or the building of specific types of bridges, but the specifications for a particular bridge will depend on the width of the chasm to be spanned and many other factors. Or, if the metaphor of an advance organizer as ideational scaffolding is carried a bit farther, one does not erect scaffolding for a particular building without a blueprint of both the foundation and the completed structure. A perusal of the research on advance organizers reveals an appalling lack of attention to (or, at any rate, lack of reporting of) the existing cognitive structures of the learners in the experimental and control groups. Statements abound such as, "It was believed that . . ." and "It was assumed that . . ." such-and-such a cognitive state existed in the subjects. Information from pretests or other pertinent data which would indicate the learners' existing cognitive structures were not given in the majority of the reports. Thus, several researchers (Jones, 1979; Lawton & Wanska, 1977; Mayer, 1979a; Meyer, 1979) have hypothesized that perhaps advance organizers failed to result in significantly improved learning either because the learners were able to provide their own subsumers or because the organizers were not sufficient to bridge the gap.

The second major reason proposed for the lack of empirical support has been the failure of most studies to analyze results in terms of what kind of learning took place (Christie & Schumacher, 1976; Mayer, 1979a). Most studies measured overall retention. Ausubel's subsumption theory predicts that the retention of conceptual ideas will be enhanced by the use of advance organizers but the retention of technical details will not. Measures of overall amount retained will not be sensitive to the selective effects. In his review of 50 published advance organizer studies, Mayer (1979b) found none which used a dependent measure that analyzed retention into individual idea units. In a recent study, Mayer and Bromage (1980) demonstrated qualitative differences in learning rather than a simple overall difference.

A third reason for the lack of empirical support for the use of advance organizers has recently been investigated by Luiten, Ames, and Ackerson (1980). Instead of classifying advance organizer studies into those finding statistically significant and nonsignificant results as Barnes and Clawson (1975) did, Luiten et al. examined 135 published and unpublished studies of the facilitative effect of advance organizers on learning and retention, using the meta-analysis technique proposed by Glass (1978). This technique enables researchers to quantify, standardize, and average treatment effects across studies of a similar type. All effect sizes, regardless of magnitude, are thus included. Using this technique, Luiten et al. found that the average participant receiving the advance organizer treatment performed better than 58% of control group individuals, indicating an overall small facilitative effect on learning and retention.

At what age level or stage of cognitive development may advance organizers be used? Although the early studies by

Ausubel and many subsequent studies were conducted using college students as subjects, advance organizers have been used successfully with nursery age children (Lawton & Ershler, Note 1), preschoolers and kindergarteners (Lawton & Fowell, 1978; Swadener & Lawton, 1977), elementary students (Lawton, 1977; Lawton & Wanska, 1979), and secondary students (Hall, 1977; Jones, 1979). On the other hand, few investigators have considered Piaget's stages of cognitive development in relation to the use of advance organizers. Lawton and his colleagues at the University of Wisconsin have been the principle researchers. They have presented evidence of logical operations by 6-year-olds, indicating that the teaching of high order concepts accelerated their progression from the preoperational to the concrete operational stage of cognitive development (Lawton, 1977). A study currently being conducted by Nielsen (Note 2) at the University of South Florida is investigating the possible facilitation by advance organizers of the transition of seventh graders from concrete to formal stages.

With what kinds of subject matter may advance organizers be used? The answer is any body of subject matter which has a systematic overall structure. This would include almost all of the school curriculum; highly structured disciplines such as science, math, and social studies are fertile fields for the use of advance organizers. In the review by Barnes and Clawson (1975) 30 of the 32 studies had been conducted in these three disciplines. The interpretation of literature might be considered a less fertile field. However, the recent work of schema theorists (Anderson, 1977; Kintsch, 1977; Rumelhart & Ortony, 1977) suggests that advance organizers ("story schema") may profitably be used in this field also.

How are classroom teachers going to construct advance organizers, lacking an operational definition and few concrete examples from research? Fortunately, the literature has provided some guidelines. According to Ausubel et al. (1978), advance organizers should have the following characteristics: (1) They should be more inclusive, abstract, and general than the learning material they precede in order to provide a framework for the stable incorporation and retention of the more detailed material to be learned. (b) They *must* take into account the relevant existing ideas that students have about the topic. This means that the level of abstractness and generality can only be determined in relation to the capabilities of the learners; e.g., the concept, "dog," may be abstract for a 2-year-old. (c) They must demonstrate the relationship between the ideas learners already have and the new ideas to be learned. (d) If the learners have few relevant existing ideas, the advance organizer needs to be more expository in nature; i.e., teachers will need to provide more informational framework, being careful, however, to use terminology familiar to the learners. (e) If the new material can be related to a cognitive framework already possessed by the learners, the advance organizer should be comparative in nature. It is then used "to integrate new ideas with basically similar concepts in cognitive structure and to increase discriminability between new and existing ideas that are essentially different but confusably similar" (Ausubel et al., 1978, p. 172).

Ausubel has not been specific as to the format for an advance organizer. In his studies with college undergraduates he used prose passages (approximately 200 to 500 words) which students read before reading the new material. Other investigators have used pictures (Farr, 1975), titles (Farr, 1975; Meyer, Brandt, & Bluth, 1978), single sentences (Christie & Schumacher, 1976; Rickards, 1976) graphic displays (Hall, 1977), slide-verbal presentations (Jones, 1977; Lawton & Wanska, 1979), and structured overviews (Earle, 1969; Estes, Mills, & Barron, 1969), as well as prose passages.

The structured overview would seem to hold the most promise at the present for classroom teachers who want to begin using a form of advance organizer. The use of the adjective, "structured," distinguishes this type of overview from those in general use; the latter generally are presented at the same level of abstraction and inclusiveness as the learning material which they introduce and emphasize the main ideas of that material.

As developed by Barron (1969) the structured overview purports to satisfy the criteria established by Ausubel for an advance organizer. Barron defined structure as the hierarchical ordering of principles (or generalizations), concepts, and details. To prepare an advance organizer for a specific unit, teachers must first determine the major understandings, or concepts, they wish the students to understand. Then they must determine which concepts must be "chained" to secure an understanding of the principles (generalizations) involved in the unit of study. Finally, they need to identify the pertinent details which, when classed together, form the major concept.

After teachers have identified the logical structure of the material to be learned (Ausubel's first criterion), they depict this structure in the form of a diagram or outline in terminology familiar to the students in such a way that the relationships between terms and the relative importance of terms are highlighted. This visual display is then presented to the students, accompanied by a verbal discussion. During the discussion teachers can, through questioning, discover relevant ideas students have about the topic, and then relate the structured overview to their background of knowledge, thus meeting Ausubel's second criterion. The discussion has the advantage of information-sharing by students, as well as permitting teachers to make adjustments in level of abstractness and in terminology.

Estes et al. have defined a structured overview as a "visual and verbal representation of the key vocabulary of a learning task in relation to more inclusive or subsuming vocabulary concepts that have previously been learned by the student" (1969, p. 41). They found no significant difference between the use of an advance organizer in the form of a 500-word prose passage (read silently by students) and a structured overview consisting of a series of vocabulary terms organized to depict the topic of the science unit (fungi) within a broad taxonomy. Thus, they concluded that the structured overview seemed to facilitate learning and retention as well as the prose advance organizer.

Further support for a visual/verbal advance organizer, such as the structured overview, may be found in the recent analysis of 135 advance organizer studies by Luiten et al. (1980). Their comparison of written and aural modes of advance organizer presentation revealed that the aural mode was more effective.

Earle and Barron (1973) used a six step set of directions to help teachers construct and implement a structured overview. Earle (1976) reported that teachers who used these directions found that the process helped them clarify their content objectives and helped students to see relationships between present, past, and future topics of study.

In this reviewer's opinion, the best single source for classroom teachers who wish to understand and use advance organizers is probably Eggen, Kauchak, and Harder's (1979) recent text, *Strategies for Teachers: Information Processing in the Classroom*. Chapter 7, "The Ausubel Model," describes the model in easily understandable terms, explores ways the model can be used in different subject areas and at different age levels, and gives profuse illustrations. Eggen et al. demonstrate the use of a prose advance organizer in three forms (definition, analogy, and generalization) accompanied

by a structured overview in the teaching of world geography.

It is clear from Eggen et al.'s illustrations that teachers must know the structure of their subject area thoroughly, must know what information their students already possess, and must be able to guide students in assimilating the new knowledge. This is surely what good teaching consists of. The combined use of a prose advance organizer and a structured overview would seem to facilitate both the teachers' and learners' tasks.

Up to this point nothing has been said in this paper regarding the relationship of advance organizers to the use of textbooks. The textbook continues to be the principle source of information in most classrooms. Ausubel et al. (1978) contend that most texts are not written so as to enhance the learning and retention of meaningful verbal material.

The more typical practice is to segregate topically homogeneous materials into separate chapters and subchapters, and to order the arrangement of topics and subtopics (and the materials within each) solely on the basis of topical relatedness without regard to their relative level of abstraction, generality, and inclusiveness. (pp. 190-191)

Instead, texts should have a hierarchical series of organizers. The initial ones should furnish anchorage at a global level. Each unit of material should be preceded by an organizer and the material within each unit should be presented in descending order of inclusiveness. Although topical segregation may be necessary, the relationship of each topic to the global subsumers should be emphasized. Ausubel et al. attempted to write their text in conformance with these guidelines, at the same time cautioning in a note (1978, p. 171) that the introductory statements at the beginning of each chapter were not true advance organizers for two reasons. First, the topics in each chapter were too broad and heterogeneous to be subsumed under a single advance organizer. Second, the preparation of a true advance organizer requires "specific knowledge of potentially relevant anchoring concepts in the learner's cognitive structure" (p. 171). The second reason is valid. The heart of Ausubel's model rests on bridging the gap between what the learner knows and what he needs to know. Only teachers can ascertain what their students already know before they begin to read a text.

The first reason, the breadth and heterogeneity of topics presented in the chapters, does not seem to be valid. Ausubel et al. could have provided a better example of text organization along the lines they proposed. Two more recent texts, one in the field of educational psychology (Hamachek, 1979) and one in the field of reading education (Friedman & Rowls, 1980), have better exemplified the use of advance organizers and the hierarchical structuring of their subject matter.

Obviously, the use of a text which includes advance organizers would make the teacher's task easier. Teachers would still have the responsibility for ascertaining what their students already know. Once this has been done, they could adapt, restate, explain, or make other necessary adjustments to be sure that the advance organizers will really function as such for the students with whom they are working.

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psychologists, educators, and others. Naturally, the perspective from which the investigators approach their work affects their perceptions and conclusions. Although the study of cognition has a long history, the last two decades have witnessed a revived interest in intellectual activities, especially in cognitive psychology.

In the receptive milieu created by these trends, the writing of two men have received particular attention. Jean Piaget, a Swiss genetic epistemologist, studied the cognitive development of children for more than half a century, mostly through observations of small numbers of children in natural and controlled conditions. Piaget has inferred from his observations of behavioral content that intelligence develops in the individual by invariant functions acting upon changing structures.

More recently, David Ausubel, an educational psychologist, has explored extensively the role of cognition in learning. His work has culminated in a cognitive theory of meaningful learning which he calls assimilation theory. This theory postulates that new information is linked to relevant pre-existing aspects of cognitive structure with both the newly acquired information and the pre-existing structure being modified in the process. Based on his model, he describes the cognitive process of subsumption with its underlying principles of progressive differentiation and integrative reconciliation. He sets his theory within the context of school learning and explores at length the types of meaningful reception learning which he believes form the core of the classroom experience.

Although interest in Piaget's work has been the greater of the two, both theories have generated considerable empirical investigation with mixed results. Recently a body of research has begun to accumulate which combines the two theories to generate unified, testable hypotheses. (Lawton, 1977a; Lawton, 1977b; Swadener & Lawton, 1977; Lawton & Fowell, 1978; Lawton & Wanska, 1978; Lawton & Wanska, 1979; Lawton & Ershler, Note 1). This body of related research seems to indicate that properly designed and implemented advance organizers result in enhanced learning, retention, and transfer and in accelerated cognitive development in children in the preoperational and concrete operational subperiods.

### Theoretical Comparison and Contrast

Are the theories of Piaget and Ausubel basically compatible or do they differ on too many major issues for their ideas to be used in conjunction with one another? Answering this question is complicated by the fact that while Ausubel comments liberally about Piaget in his book *Educational Psychology: A Cognitive View*, there are no sources of Piaget's response to Ausubel's thinking. Therefore, Ausubel's perspective will be adopted in this discussion.

Ausubel primarily accepts Piaget's stage-dependent theory of cognitive development. In responding to critics of Piaget's work, he states, "Actually, developmental stages imply nothing more than identifiable sequential phases in an orderly progression of development that are qualitatively discriminable from adjacent phases and generally characteristic of most members of a broadly defined age range" (Ausubel et. al., p. 225). In his consideration of school learning, however, Ausubel eschews Piaget's complex arrangement of periods, subperiods, stages, and substages. Instead, he stipulates three general stages in children's cognitive development differing most significantly along the concrete-abstract dimension: the pre-school child can generally understand concepts only if their criterial attributes can be related to multiple exemplars of the concept before relating it to cognitive structure; the elementary school child

## COMPARATIVE EVALUATION OF THE COGNITIVE THEORIES OF PIAGET AND AUSUBEL

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Cognition, the act or faculty of knowing, has been the object of investigation since ancient times. Two areas of cognition in particular, cognitive development and cognitive processes, have been studied extensively by biologists,

can understand the meaning of a concept by relating the criterial attributes directly to cognitive structure with the aid of concrete-empirical examples of those attributes; and the secondary student can understand and manipulate abstract ideas and relationships among them directly, without the benefit of concrete props (p. 206).

Although Ausubel basically accepts Piaget's theory as valid, he does take exception to some of Piaget's formulations when specifically applied to education. The points of difference he lists include: Piaget is concerned solely with the development of thoughts as opposed to comprehension; by identifying the operations of thought with the operations of logic, Piaget confuses a special tool of thought with the actual operations of thought in problem solving situations; Piaget attributes to thought the quality of implicit action in contrast to the widely accepted view of thinking as a reorganization of elements in cognitive structure to meet the requirements of a situation; Piaget places prime emphasis on endogenous motivation, largely ignoring education's role of stimulating the development of new motivations from existing potentialities; Piaget discounts education's role in promoting cognitive development, placing instead great emphasis on spontaneous or incidental experience; Piaget denies the role of education in accelerating cognitive development or in facilitating transfer from one stage to another; and Piaget believes the function of language is communicative, attributing to it no operative role in thought (p. 231).

The third issue raised by Ausubel, that Piaget conceives of thought as action in opposition to thought as reorganization of cognitive structure, represents a basic difference between the two men. Piaget emphasizes the processes of thought while Ausubel focuses more on the manipulation of content. Ausubel says the belief that "it is feasible to teach general cognitive operations isolated from actual subject-matter content not only makes excessive demands on children, but is also artificial in terms of particularized contents which such skills necessarily assume in each discipline" (p. 231). Shulman (1970), in discussing the relation of psychology to mathematics education, describes Ausubel's stance strongly: "He remains a militant advocate of the importance of mastering well-organized bodies of subject-matter knowledge as the most important goal of education" (Shulman, 1970, p. 36). In a paper proposing assimilation theory as an alternative to Piagetian psychology, Novak (1977) explores this same dichotomy by saying, "The key issue . . . is whether children develop general 'cognitive structure' or 'cognitive operations' to make sense out of experience, or, if instead, they acquire a hierarchically organized framework of specific concepts, each of which or some combination permits them to make sense of an experience . . ." (p. 455). Novak (1977) would support the latter position.

Another point of difference identified by Ausubel is that Piaget believes the most important form of motivation to be endogenous, or originating within the individual, which in turn, suggests discovery learning as the most effective type of education. While Piaget favors discovery learning for all children, Ausubel suggests that meaningful reception learning is most appropriate for children in upper elementary and secondary school who have acquired a basic conceptual store. Ausubel explains that the nature of the abstract stage of cognitive functions permits individuals to learn most new concepts and propositions directly, grasping verbally or symbolically stated relationships between previously learned abstractions. Exemplars or props are used for illustrative purposes only.

While the difference in emphasis on discovery versus reception learning by these two men is clear, their translation of the implications of formal operations for instruction is less

oppositional. In particular, the function of language emerges as an issue. Although Ausubel implies that Piaget posits that language has no operative or process role in thought, he is being overly simplistic in his interpretation. Piaget does stress that during the sensory motor period of development "representational thought does not begin with and result from the incorporation of verbal signs from the social environment" (Flavell, 1963, p. 155). Rather, symbolic representation leads to the acquisition of language. However, in contrasting his proposed active method against receptive methods, Piaget himself emphasizes that the activity need not always involve physical manipulation of objects. For older children "the most authentic research activity may take place in the spheres of reflection, of the most advanced abstractions, and of verbal manipulations (provided they are spontaneous and not imposed on the child at the risk of remaining partially uncomprehended)" (Piaget, 1970, p. 68).

Related to the emphasis on discovery learning, Ausubel states that Piaget stresses spontaneous or incidental experience over formal education in promoting cognitive development. Ausubel somewhat resolves the conflict by stipulating two types of readiness occurring within the individual: specific and general. General readiness reflects a cumulative product of genic effects, incidental experience, and learning in which subject-matter learning affects cognitive capacities in a general way. Specific or subject-matter readiness, in contrast, is based on acquiring prerequisites for particular learning. "Experience or learning *any* subject-matter produces general as well as specific *developmental* changes in cognitive capacity in addition to specific changes in subject-matter readiness" (Ausubel et al., p. 249).

Piaget also categorizes cognitive achievement along a general-specific continuum, particularly for the adolescent, albeit in a more structured manner than does Ausubel. Most general is the group-lattice structure of formal thought; most specific are task linked concepts emerging from work with Piagetian experiments. Formal operational schemata are intermediate in generality and can be applied across a range of problems (Flavell, 1963, p. 222). Therefore, a general cognitive structure indeed emerges for Piaget, but its formation is augmented by specific task-concepts of subject-area content.

Having distinguished between two levels of cognitive development, Ausubel continues by suggesting that appropriate school experiences can accelerate more general development, particularly that of transition from one level of operations to another. While Piaget concedes that some acceleration, albeit necessarily limited in extent, is certainly possible. Ausubel emphasizes the role of training and education. He is especially interested in the transition from concrete to abstract thinking. The general training procedure he describes takes place in anticipation of the next higher developmental period after the current stage is fairly well consolidated. To move from concrete to formal operations he suggests "gradually withdrawing the concrete-empirical props as the prior stage becomes consolidated—that is, by withdrawing the props well in advance of the actual attainment of abstract cognitive functioning" (p. 249-250). He concludes, "On theoretical grounds there is no reason why *only* incidental (spontaneous, undirected, unexplained) experience (despite Piaget's insistence to the contrary) must effect the gradual cumulative change in intellectual capacity that makes transition to a higher stage possible" (p. 248).

Again, despite Ausubel's insistence to the contrary, Piaget suggests a similar instructional approach. Because of the importance to Piaget of the key concept of gradual transformation of overt action into mental operations, Piaget

indicates that the teacher should assist this process by encouraging the student to work with progressively less direct support from the external givens (Flavell, 1963, p. 368). Ultimately, the external actions can take place internally and in complete autonomy from the environment.

Finally, in considering the concrete and abstract periods of cognitive development as well as the transition between them, Ausubel makes some distinctions between Piaget's thinking and his own that seem to differ more in emphasis than in substance. Without explicitly using Piaget's term *decalage*, Ausubel iterates that the movement from concrete to abstract functioning must occur separately in each discipline. He does hypothesize, however, that the general overall stage of development is transferable to the new discipline. This is due to "the existence of a larger body or 'critical mass' of stable abstractions in cognitive structure and of sufficient transactional terms for relating them to each other, as well as considerable experience in comprehending and manipulating abstract ideas without the benefit of concrete props in other disciplines" (Ausubel et. al., p. 206). Therefore, while the individual who has achieved formal thought must move anew through concrete to abstract reasoning in each new discipline, the process is greatly accelerated.

Furthermore, he identifies a different critical feature as the quality distinguishing between concrete and formal operations. For Piaget, this feature is that the more advanced child "is able to deal internally with ideas about ideas or to perform 'second order operations'" (p. 237). Ausubel modifies this view considerably by stating, "It is rather the preadolescent's and adolescent's ability verbally to manipulate relationships between ideas in the absence of recently prior or concurrently available concrete-empirical proofs that is the distinctive attribute of formal operations" (p. 237). He supports this premise by maintaining that concrete operational children can draw correct inferences from hypothetical premises involving abstract relations.

Ausubel recognizes a general similarity between Piaget's formulation of the assimilation process and his own assimilation theory. This similarity stems from the provision in Piaget's view of assimilation for the absorption of new into existing schemata which is generally analogous to subsumption. Ausubel quickly adds, however, that "not only does Piaget fail to go beyond this general statement of assimilation and describe explicitly how assimilation occurs, he also conceives of assimilation solely in terms of developmental progressions rather than in terms of a contemporaneous learning process" (p. 231).

Difficulties stemming from two different definitions of the same word—assimilation—exemplifies how confusing terminology overshadows some of the interrelatedness which actually does exist between the two theories. For instance, the two types of subsumptive learning, derivative and correlative, are roughly akin to assimilation and accommodation although the relation Ausubel identifies is between assimilation and subsumption. More formally, Ausubel's assimilation theory of meaningful learning involving progressive differentiation and integrative reconciliation appears to be analogous to adaptation with its complementary processes of assimilation and accommodation.

## IMPLICATIONS

The explication and comparison of the theories of Jean Piaget and David Ausubel indicate that the two cognitive theories are compatible and perhaps even complementary. From this assumption, pedagogic implications emerge particularly for the use of advance organizers in instruction.

Although the discoveries and technology of today's world are engendering an ever-accelerating movement towards tomorrow's reality, the bulk of the learning in the schools continues to be that of meaningful verbal materials. In fact, because of burgeoning knowledge, the amount of materials learned has increased exponentially. How to facilitate learning, retention, and transfer of meaningful verbal materials is a prime concern of education. Appropriately designed and implemented advance organizers appear to be one means to this end.

Moreover, Piaget posits that cognitive ability varies qualitatively with the developmental stage, suggesting that different types of instruction are more appropriate than others at specific developmental points. That carefully designed advance organizers have been proven to be facilitative in preoperational and concrete operational children is consistent with this position. The weight of the research evidence in support of these points gives credence to systematically using advance organizers in the classroom. (See, Searls, Note 2, for specific guidelines.)

However, the scope of the research combining the two theoretical bases has been limited largely to work with young children and some serious methodological problems have been evident. Additional work needs to be undertaken with children of different age groups.

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## REACTION: NIELSEN'S COGNITIVE COMPARISONS AND SEARLES' ADVANCED ORGANIZERS

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I was especially pleased to be asked to react to these two papers, because for the past several years I have been playing with Ausubel's notions of advance organizers and speculating as to why the research results have been so mixed and inconclusive. Laurie Nielsen has done a fine job of modeling her message and interpreting two difficult gentlemen, Ausubel and Piaget.

Refreshing my memory of Piaget's active model of stages of language development and relationships to thought processes one aspect seemed to stand out. It seems to me that Piaget's stages can have as much to do with the developmental sequences of mental operations in general as it does with age or level descriptions of cognitive processes. There is a sequence and we go through it at age 50 (when material is new and complex) as well as at age 10. We move rapidly or slowly from pre-operation or concrete to formal operations, depending upon the task, our purpose and our background of experiences.

I would further add a reminder of a suggestion made by Patricia Arlin (*Developmental Psychology*, Vol. 2, 1975, 602-606) that Piaget omitted a fifth stage which she termed "Problem-Finding." At this higher level we are pushed to creative thought, envisioning new questions and discovering new heuristics in adult thought.

This ties in with a problem that keeps surfacing all too frequently in my work with secondary and adult reading, and that is the ancient and absurd notion that we would not need secondary reading if elementary teachers truly did their jobs. How absolutely erroneous this is! Those who take this position are actually defining reading in the narrow sense of the early "learning to read" skills with emphasis on story reading, and forgetting the demanding tasks of technical content reading. They are neglecting theories of cognitive development beyond elementary years, ignoring the notion of reading maturity and the formal operations hierarchy. Indeed, in older more mature readers reading, thinking, studying are often indistinguishably intertwined.

Turning now to Ausubel and implications for the classroom and for teacher education, Evelyn Searles' paper has given us some practical applications to consider.

I agree with Searles that all ages can benefit from the use of advance organizers, and that material which readily lends itself to this technique is already written in a systematic fashion containing overall structure. I would suggest though that it is also possible and can be beneficial to use advance organizers with material not overtly containing this structure. You can impose a structure on literature, for example, with recognition of a story schema or the technique of flashbacks.

As we know, the *active* participant is the one who learns and benefits most. Teachers may welcome having advance organizers provided for their student in the text, but the best kind of written organizer comes from the teachers themselves who must go through the process of determining what *they* consider crucial to emphasize and what cognitive levels the students can handle successfully. What are their students' models for structuring knowledge or problem-solving? Let us do more in helping teachers learn how to develop their own advance organizers.

I also agree with the notion of using structured overviews because of the power of the visual/verbal connections where key terms are arranged in diagrams (e.g., mapping, semantic webbing) and students and teachers discuss the concepts. These overviews are beneficial when they simplify, encourage student interaction, explain, and refer to specific data.

Finally, conflicting research results concerning the efficacy of using advance organizers mean little because for the most part, vital components or crucial issues were often not addressed. What we do *not* know from these reports is far more influential than what we *do* know. Generally, we do not know:

- (1) what the makeup of text material was in terms of a need for an advance organizer in the first place. Was the structure already evident to the reader? Was the material too short or clearly written to need this aid?
- (2) whether the advance organizer met the three criteria of being more abstract (concentrated summary), more general (broader in scope) and more inclusive (comprehensive).
- (3) the learners' background information. At what cognitive level were they? Did they require an expository organizer (for new information)? Would a discourse or graphic organizer be best?
- (4) the intent and quality of the post tests. Did they measure the *product*, recognizing and recalling knowledge, or the *process*, such as ability to apply information to new situations. Did they measure immediate recall as well as retention and retrieval?

Let us not dismiss the use of advance organizers based on such existing incomplete data. Whether we agree or not as to the best form, anticipatory readiness activities of some sort are beneficial to most readers encountering new and difficult textual materials, and for that there should be little argument.

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**READING RATE AS A FACTOR IN COMPREHENSION  
AT THE COLLEGE LEVEL**

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Many college reading programs attempt to teach students to read rapidly. This rapid reading is intended to aid students in reading the volume of material required in college coursework. Such programs generally include comprehension checks after paced and non-paced reading. Of interest to the investigators was the relationship of rate to comprehension on college-level reading material, both after paced and non-paced reading.

This study is two-fold in that it examines the relationship of rate to comprehension on material read with a pacer, and it examines the same relationship on material read without the use of a pacer. Paired scores ( $N=202$ ) were obtained during winter and spring quarters of 1980 in Reading 1000, a reading

and study skills course at East Tennessee State University. The instructor was the same for all students and classroom procedure was the same for all classes. Students read both paced and non-paced material alternately during class time and recorded rate and comprehension scores for each reading. Pacers used were SRA models.

## REVIEW

### Relating Speed and Comprehension

Blommers and Lindquist (1944) after surveying studies comparing reading rate and comprehension reported correlation coefficients between them ranging from  $-.47$  to  $.92$ . These correlational findings are not surprising, in that subjects were tested at many grade levels. Blommers and Lindquist investigated the relationship between rate and comprehension on tests developed to yield measures valid for such a study. They cited the following items as affecting reading rate: the nature of the material used—vocabulary load, sentence structure, difficulty, typographical features; the reader himself—his skills, habits, mental and physical state, etc.

In an earlier study, Judd (1916) concluded that high rate and good quality of reading are commonly related and low rate and poor quality are commonly related. Based on five reading tests, Gates (1921) found a correlation of  $.84$  between composite reading rate score and composite comprehension score. He contended that in detailed individual analyses of cases there is a real and useful distinction between the terms "ability to comprehend" and "rate of reading." King (1916), however, in contrast to the other findings, obtained a correlation of  $-.47$  between the two. This disagreement seems to be a function of testing procedures, materials chosen, and reader characteristics.

Preston and Botel (1951) tested the hypothesis that speed and comprehension are unrelated. They found a statistically significant correlation ( $.48$ ) between rate and timed comprehension and a nonsignificant relationship ( $.20$ ) between rate and untimed comprehension. They concluded that tests of reading which include speed in the measurement of comprehension are invalid measures because speed and comprehension are relatively independent of each other. In studying the relationship between speed and comprehension when no time limits were introduced, Stroud and Henderson (1943) found the correlation of time and comprehension to be low and concluded that the factors were independent.

Shores and Husbands (1950) examined the hypothesis that faster readers were better readers on problem-solving material when a purpose was set for reading. They concluded that there is almost no relationship between speed and comprehension when (1) speed and comprehension are measured simultaneously using science material; (2) the purpose for reading is given in advance; (3) inferences are required before problem solving; and (4) critical thinking is required for comprehension. They contended that comprehension is less dependent on speed than on intelligence. Shores (1961) replicated their work and found that speed was influenced by purpose.

The manner in which comprehension is measured also affects the correlation between rate and comprehension. Letson (1958) found relatively high correlations ( $.46$  and  $.77$ ) between rate and correct number of items (on a comprehension measure) and a correlation of  $-.10$  between comprehension and the number of items attempted. He concluded that the relationship between speed and comprehension decreases as the difficulty of the material in-

creases.

Robinson and McCollum (1934) studied the upper 15% and the lower 15% of a group of students to determine the relative influence of rate and comprehension on reading test scores. They concluded that good readers score higher in both speed and comprehension but speed is the greater determinant of test scores. Comprehension questions covering higher levels of questioning favor good readers.

The measurement of speed and comprehension is a controversial issue. According to Davis (1962), "Number of words read per minute is, in itself, a meaningless score. To be meaningful, it must be associated with a score indicating the extent of comprehension that has been attained" (p. 30). Spache (1962) challenged the idea of multiplying the two scores for rate and comprehension as a measure of effective rate. Braam (1963), however, advocated such a practice.

There is evidence to support the hypothesis that a relationship between comprehension and rate may depend upon the nature of the test materials themselves. Tinker (1932) cited three research methods which were used to obtain rate and comprehension correlations. The first method compared the speed with which a text is read with the recall of the material. This comparison usually yielded low correlations. Tinker (1932) asserted that recall of this type is not comprehension; therefore, the correlations obtained were invalid. The second technique involved obtaining speed and comprehension scores from children who were reading different materials. Tinker (1932) criticized this approach because the subject matter differed from test to test and the correlations obtained measured "somewhat different combinations of the many functions involved in reading" (p. 159). The third method compared rate and comprehension on identical reading texts. These correlations were consistently high. Gates (1921) obtained positive correlations of  $.90$ ,  $.96$ ,  $.93$  and  $.88$  for grades 3 through 6, respectively. On an early test of reading, Paterson and Tinker (1930) found a corrected correlation coefficient of  $+1.00$ . Tinker (1932) concluded, "The only adequate method of discovering the true relation between speed and comprehension in specific reading skills is to measure rate and comprehension on the same or strictly comparable material" (p. 160). He further stated that there is a close "relation" between speed and comprehension in reading. In a later study, Tinker (1939) reported that the relationship between speed and comprehension decreased as difficulty increased, especially when tests required specialized information. He concluded that when textual content is within the reader's experiential background, speed and comprehension are highly correlated.

Gray (1925) summarized several investigations and concluded that the evidence indicated a positive correlation between speed and comprehension, that the correlation is variable, and that correlations are higher with children than with adults.

Eurich (1930) found a stronger relationship between a pre-reading test of information and reading rate than he did between reading speed and post-reading test of comprehension. This finding indicated that familiarity with the material affected correlations. The 26 correlations he reported had an average value of  $.31$ , indicating a low-to-moderate correlation between speed and comprehension. Thurstone (1944) reported correlations of  $.11$  on physical science material,  $.42$  on literary material and  $.44$  on social science material.

### Variables Determining Reading Rate

In an early study, Quantz (1897) defined the following variables in reading rate: visual perception, practice in

reading, power of concentration, mental alertness, complex reaction times and scholarly ability. O'Brien (1921) reviewed the literature on speed in silent reading and concluded that the following variables affect rate: practice in rapid silent reading, amount of vocalization, training in perception, subject matter difficulty, habits of eye movement, purpose for reading, concentration of attention, ability to grasp meaning, reaction time, visual imagery, recognition of the value of rapid silent reading, and desire to read rapidly.

Indications that visual and auditory processing time as well as memory may be variables in reading rate and comprehension have been found by several researchers. Geyer (1968) said, "Until recent years neurologists believed the visual system to be relatively simple . . . the reading process was conceived as a series of tachistoscopic presentations flashed to the brain by saccadic movements of the eye" (p. 45).

In a study by Katz and Wicklund (1971), good and poor readers were measured on word scanning tasks. They found that there was no significant difference in scanning rate. Results pointed to the conclusion that the process involved in simple reaction time did not account for good reading in scanning tasks.

Rogers' (1969) research suggested that poor auditory memory is a causal variable in reading retardation as measured in oral reading and that auditory memory can be influenced by reinforcement techniques. In contrast to the Katz and Wicklund (1971) findings, Traxler (1934) believed that some individuals have slow rates because of a lag in thought processing. Sutherland (1946) concluded that rate of reading and rate of perception are related to perceptual span.

The Holmes-Singer Substrata-factor Theory (Singer, 1965) of reading was designed to explain the mental structure and dynamics involved in reading ability. Singer (1965) asserted, ". . . general reading ability is an audiovisual processing skill of symbolic reasoning. This ability divides into two major interrelated components: speed and power of reading" (p. 1). Joined by short- and long-term memory processes, neurological subsystems may be mobilized to attain speed and power. These subsystems are identified as input (sensation and perception of stimuli), mediation (interpreting, inferring, and integrating ideas) and output (response formulation).

The speed of reading criterion to identify variance accounted for was assessed for the total sample as follows: auditing, 14%; visual verbal meaning, 18%; homonyms, 9%; reasoning, 8%; literary interest, 3%; unaccounted for, 45%.

The intelligence of the reader also seems to affect the correlation between speed of reading and comprehension. Carlson's (1949) research examined whether speed of reading is a unitary skill that can be acquired by some sort of pacing device, for example, or a complicated (and idiosyncratic) process acquired by each individual. He concluded that there is a tendency for less intelligent readers to read better at faster rates. He found that intelligence, readers' purposes, difficulty of material, continuity of text and opportunity to reexamine the text while answering questions also affected comprehension. There was an increasingly negative degree of relationship between rate and comprehension as material difficulty increased when middle and low intelligence groups were tested.

### Physical Constraints

Reading rate may not only be limited by processing time or memory but by the related physical constraints of the eye and its movement/fixation capabilities as well. Spache (1962)

observed that if a reader reads

. . . most of the words on a page, it is impossible to read faster than 800 to 900 words per minute. This fact derives from the amount of time necessary for (1) the shortest fixation (approximately 1/6 to 1/5 of a second during which reading occurs); (2) for the sweep or saccade to the next fixation (1/30 to 1/25 of a second); and (3) the maximum number of words that the eye can possibly see with a single fixation during the continuous reading (probably 2.5 to 3 words) (p. 262).

Taylor (1962) reported research of eye-movement studies and reported that through hundreds of studies involving eye-movement photography, it has been determined that no one has an average span that permits the intake of more than one word at a fixation. He quoted research which documented that the average span for the college student reading 280 words per minute is only 1.1 words. Pauk (1968) stated that there was no evidence that the mind can even deal with more than one word at a time.

Shores (1968) noted that the physical presentation of printed material may determine how rapidly one reads and how well one comprehends. He stated that these two variables may be affected by type, typestyle, legibility, and paper quality.

Much research has been directed toward the role of sub-vocalization or implicit speech in reading rate and comprehension. Betts (1950) believed that any form of vocalization or lip movement retards the rate of silent reading.

In contrast to Betts' opinion, several authors contend that vocalization appears to be an integral part of the reading process. Rose (1969) reasoned that acoustic rehearsal of stimuli is important in meaningful reading. Sperling (1963) asserted that utilization of items in reading is not limited by visual factors but by the rehearsal process to a rate of ten syllables per second or slower.

Both Smith (1971) and Huey (1968) felt that optimal reading rate is directly related to comprehension. Rankin's (1963) research suggested that comprehension may be dependent upon speed of reading among mentally competent readers.

## RESULTS

Pearson product moment correlations for rate and comprehension on paced and non-paced material were computed between the paired scores ( $N = 202$ ) obtained on both paced and non-paced reading selections. Results showed a strong correlational relationship (.52,  $p < .001$ ) between rate and comprehension on non-paced reading. Mean rate was 225 words per minute, and the mean comprehension score was 60.75%. A correlation of .08 was found between rate and comprehension on paced material and was not significant ( $p < .05$ ). Mean rate was 365 words per minute with a mean comprehension score of 40.67%. Mean difference in paced and non-paced comprehension scores on a  $t$  test for correlated data was found to be significant at the .001 level as was mean difference in paced and non-paced rate scores.

A scattergram of rate and comprehension frequencies by deciles provided information which was used graphically to illustrate the relationship between rate and comprehension for both paced and non-paced scores. Reading speed scores were divided into deciles, each category containing approximately 10% of the population. The exact limits and midpoints of each interval were calculated for the decile categories. Figure 1 illustrates the increasingly positive relationship between rate and comprehension which occurs up to the 225-250 words per minute range. After that range the relationship exhibits a change and a variation in rate does not seem to markedly

affect comprehension.

Figure 2 illustrates the relationship between rate and comprehension on paced material. There seemed to be little change in the relationship between rate and comprehension on paced material, and the representation was almost linear.

### CONCLUSIONS AND IMPLICATIONS .

According to the results of this research, the relationship between reading rate and comprehension is not constant in non-paced material. Below approximately 250 words per minute there was positive and significant correlation between rate and comprehension, yet above that rate little or no relationship existed. At above 250 words per minute on non-paced material and on all paced material, a difference in comprehension must be accounted for by variables other than reading rate. It may be that interest or experience factors become determinants of comprehension, or that the pacing device itself may affect comprehension.

Also of interest is the question as to whether the pacing device contributed to higher rate scores on non-paced material, because students completed both types during each class meeting. Although the mean rate for non-paced was lower than that of paced material, the mean rate may indeed have been lower still had there been no paced practice. Further study is planned to investigate this question.

The investigators believe that the relationship between rate and comprehension depends upon the rate and comprehension ranges examined. In beginning reading, there is a change in the relationship at approximately 55 words per minute (Strader, 1975). It seems that the critical rate changes as the age and reading proficiency of subjects is varied.

This study leads only indirectly to instructional applications. As a result of this study more investigation into use of reading pacers will be instigated. Motivational aspects versus concrete data on pacer use may be questioned. The time constraint for reading definitely affected the relationship between rate and comprehension. However, confounding of the variables may have occurred in carry-over to non-paced material. Further investigation is necessary.

Figure 1

Graph Representing Relationship of Rate to Comprehension Scores on Non-Paced Materials

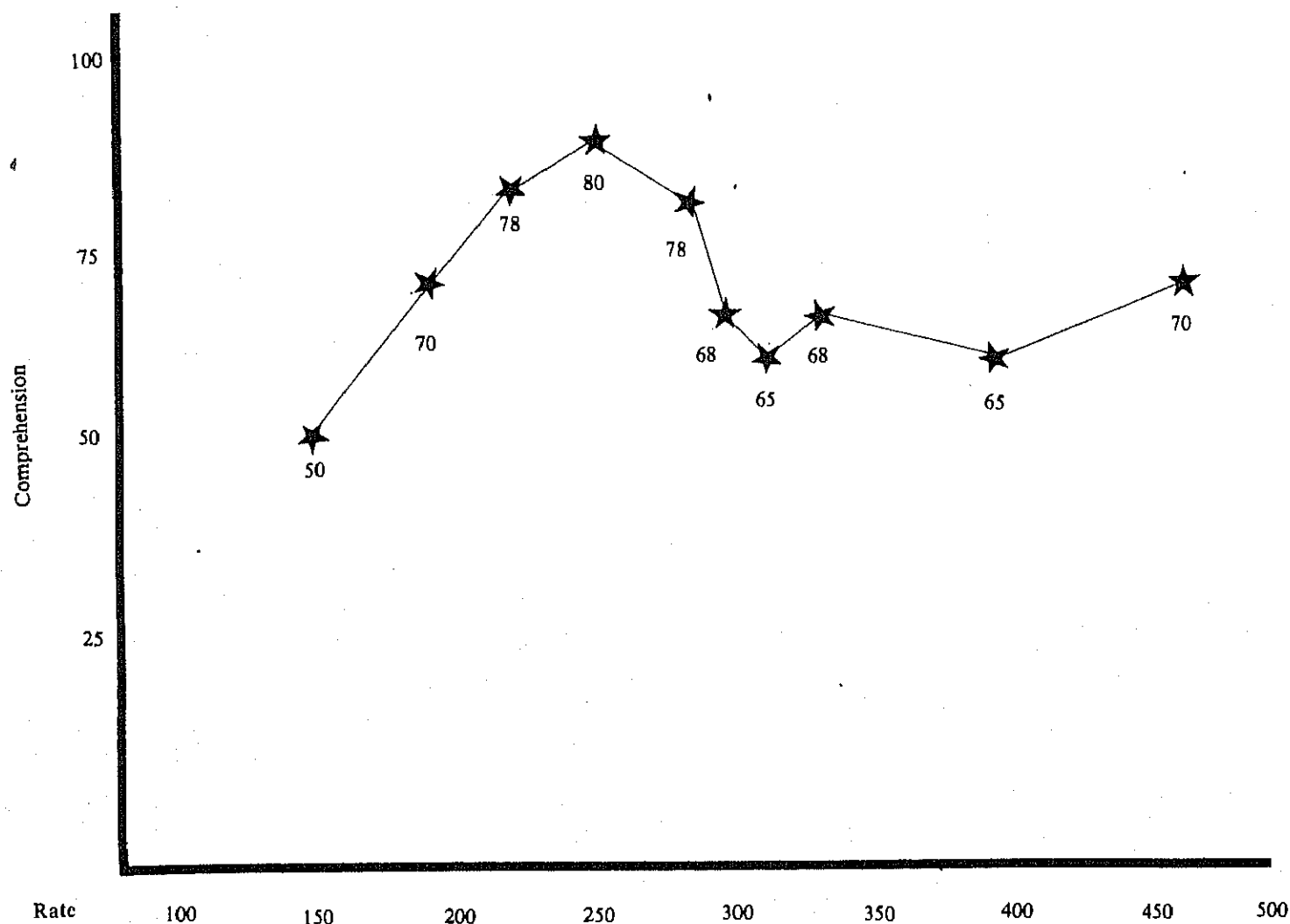
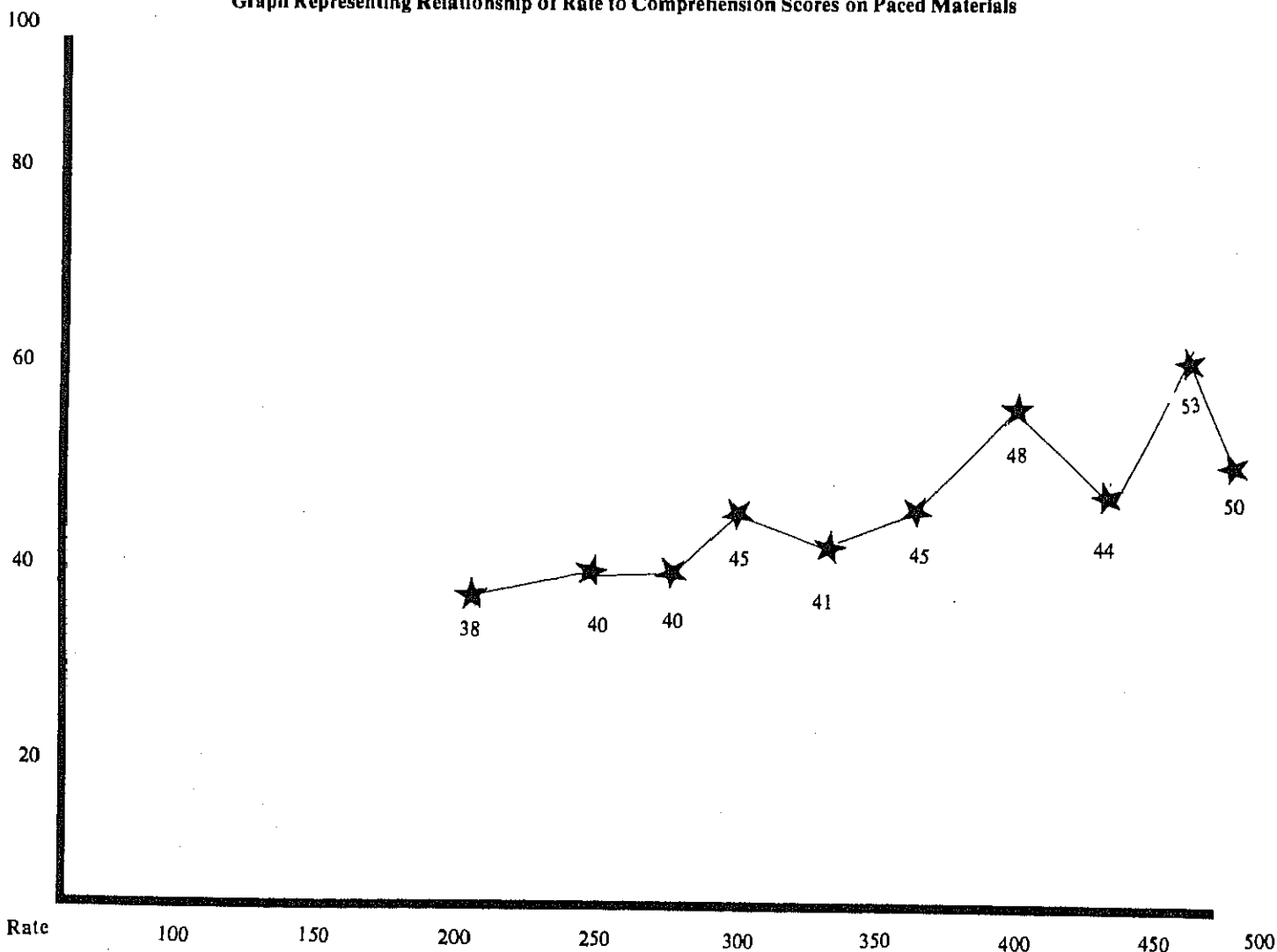


Figure 2

## Graph Representing Relationship of Rate to Comprehension Scores on Paced Materials



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