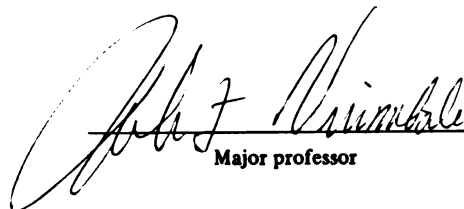This is to certify that the

thesis entitled

THE CLINICAL PROBLEM SOLVING BEHAVIOR OF CLASSROOM
TEACHERS AS THEY DIAGNOSE CHILDRENS' READING
PERFORMANCE IN EXPERIMENTAL AND CLASSROOM SITUATIONS
presented by

DORON GIL

has been accepted towards fulfillment
of the requirements for

_____Ph.D._____ degree in _Eduaation_

Major professor

Date 11.1.79

O-7639

THE CLINICAL PROBLEM SOLVING BEHAVIOR OF CLASSROOM TEACHERS

AS THEY DIAGNOSE CHILDREN'S READING PERFORMANCE

IN EXPERIMENTAL AND CLASSROOM SITUATIONS

By

Doron Gil

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree

DOCTOR OF PHILOSOPHY

Department of Student Teaching and Professional Development

1979

ABSTRACT

THE CLINICAL PROBLEM SOLVING BEHAVIOR OF CLASSROOM TEACHERS
AS THEY DIAGNOSE CHILDREN'S READING PERFORMANCE
IN EXPERIMENTAL AND CLASSROOM SITUATIONS

By

Doron Gil

The purpose of this study was to investigate the
clinical problem solving behavior of classroom teachers in
reading diagnosis.

The literature on reading instruction views classroom
diagnosis as an essential part of the total reading instruction.
Most researchers believe classroom teachers have the responsi-
bility to conduct necessary diagnoses and provide the
appropriate remediations for students with reading defi-
ciencies. No empirical evidence exists, however, to show how
capable classroom teachers are of performing these functions.
Also lacking from the literature is a description of the
cognitive processes teachers employ as they attempt to
diagnose students' reading difficulties.

There were two objectives to this study: (1) to
investigate the clinical problem solving behavior of class-
room teachers, in both experimental and classroom situations,
as they gather data about children's reading difficulties to
arrive at diagnostic judgments about the children's

difficulties; and (2) to explore the similarities and differences between teachers' diagnostic practices in experimental and classroom situations.

Ten teachers from the Chicago and the Lansing areas participated in the study. Research was carried out in two phases. In the first, the teachers interacted with simulated cases of reading difficulties in a laboratory setting; in the second, they were observed and interviewed in their own classrooms.

Each of the ten teachers interacted with two simulated cases (at two different times). The cases were built on materials that would be available to the teacher in a regular classroom setting and made use of children's natural language patterns. After each interaction, the teachers went through a stimulus recall session.

A few weeks after the laboratory experiment, each teacher was observed in her own classroom during one reading session and interviewed about her reading instruction and diagnostic practices.

Data analysis consisted of product measures, process measures, and analysis of classroom interviews. Product measures dealt with the outcomes of the clinical encounter between a teacher and a case (e.g., what final diagnostic judgments were made about the case; what cues were collected, etc.). Process measures focused on the manner in which the problem was diagnosed (e.g., length of interaction, number

of cues collected, number of final stated diagnostic judgments, and the relationships between cues collected and teachers' verbatim comments about these cues).

Classroom interviews were analyzed in terms of (1) diagnostic categories mentioned in the classroom, (2) remedial techniques offered, and (3) teachers' responses to various questions in the interview. Comparisons were also made between teachers' classroom diagnoses and their laboratory diagnoses.

The major findings of this study were that: (1) teachers showed little agreement on their final stated diagnostic judgments for the cases of reading difficulties, (2) they apparently lack comprehensive or systematic approaches to gathering and evaluating information about cases of reading difficulties, and (3) they use the same global diagnostic categories in laboratory situations and in the natural classroom environment.

ACKNOWLEDGMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

THE PROBLEM

Introduction

Many of today's students have reading deficiencies,
a problem which is of major concern among educators (Satz,
1977). Many children, taught under a skill-model, seem to
have failed to acquire some basic reading technique(s) in
the early grades: Among those are word identification
skills, phonics and structural analysis, comprehension, etc.
The sources of the problems, educators claim, are multiple.

Because classroom reading instruction is develop-
mental (Austin, 1968; Carter & McGinnis, 1970, p. 28),
reading deficiencies, if uncorrected, may become pro-
gressively worse, and might interfere with general learning.
Wilson (1977) maintains that "inability to read coupled with
the lack of desire to read, leads directly to school failure"
(p. 1). Thus, if the school teaches the child anything, it
is what failure means (Smith, Carter & Dapper, 1970, p. 4).
Furthermore, the fear of failure becomes more intense as the
child grows older (Reich, 1962) and this, in turn, might
result in a number of emotional problems: tension, anxiety,
frustration, short attention span, and inability to do
independent work (Smith, Carter & Dapper, 1970). These

1

problems may impair personal development and behavior (Whitcombe, 1976; Medrano, 1977). Thus, children with reading difficulties do not perform at their potential level of effectiveness, since every phase of their academic and personal development is directly or indirectly affected by their reading problems (Sherman, 1968).

Classroom teachers must be able to identify reading difficulties early and to diagnose and treat them. Early identification and correction may prevent problems from becoming more complex and, hence, more difficult to treat (Bond & Tinker, 1967). Early treatment might also prevent many of the learning and emotional problems that accompany reading deficiencies.

Unfortunately, a number of reading consultants believe that, at present, the retarded reader is not identified and treated or referred to help early enough (Carter & McGinnis, 1970). Classroom teachers, some researchers feel, seem to lack the basic clinical skills necessary to engage in these preventive processes (Adams, 1971; Stephens, 1978). This is a serious problem, because, according to some educators, "educational adjustment alone cannot correct a problem which has been ignored for a long time to which there is a severe emotional problem" (Wilson, 1977, p. 65).

If diagnosis and remediation of reading difficulties are fundamental aspects of reading instruction, there is a need to improve the diagnostic and remediation skills of classroom teachers. For this to be done, one must first

study the diagnostic and remediation skills which teachers
currently have.

The Problem

The purpose of this study was to investigate the
clinical problem solving behavior of classroom teachers as
they diagnosed children's reading problems, in both experi-
mental and classroom situations. In other words, it was
intended to examine how teachers gather data about children
with reading difficulties and how they diagnose those
difficulties.

In a recent paper about instructional practices in
reading, Pearson and Kamil (1978) argue that the techniques
teachers use for instruction are determined largely by the
models of reading they follow. That is, a teacher might
emphasize print translation or context and memory, or both,
depending on the model he/she prefers. The model, or theo-
retical conceptualizations of the reading process, further
influences which sub-reading skills, -- such as decoding,
getting meaning from the printed page, etc., -- are stressed.
Models also suggest certain diagnostic strategies. For
example, those models which "teach to weaknesses" and empha-
size sub-skills, sequencing and automaticity suggest the
following diagnostic steps:

> "(1) define a set of objectives, one for each
> skill or interest, (2) place them in a logical
> sequence, (3) write a test for each objective, (4)
> administer the test to a group, (5) examine skill
> profiles, looking for peaks and valleys, (6)
> beginning with the earliest skill in the sequence,
> remediate all the weaknesses" (Pearson & Kamil,
> 1978, p. 20)

Those models which focus on meaning and "teaching to strengths", on the other hand, suggest these diagnostic steps:

"(1) determine the components of the reading process in which a student demonstrates proficiency, and (2) capitalizing on those strengths, help the student learn how to generate meaning, hypotheses, gathering whatever data he needs to confirm or disconfirm those hypotheses: (Ibid. p. 20)

An integral part of a diagnosis, regardless of the strategies used, is the teacher's cognitive and diagnostic processes; e.g., how he/she processes the information he/she has collected to reach diagnostic and remedial decisions about the child's problems. As the review of the Literature section will show, these cognitive processes, collectively referred to as "clinical problem solving behavior", have not yet been researched; hence there is a clear need for studies such as this one.

This study builds upon research in progress of the Institute for Research on Teaching (IRT) at Michigan State University. The main thrust of this research, conducted by the Clinical Studies component of the IRT, is the investigation of clinical problem solving behavior in reading diagnosis (Gil et al. 1979). Most research efforts to date have concentrated on the clinical problem solving behavior of reading specialists. The present study was intended to broaden the scope of this research by exploring the clinical problem solving behavior of classroom teachers.

Research Tasks

Investigation of the clinical problem solving behavior followed by teachers in diagnosing reading difficulties have

rarely been conducted. For that reason, this study was intended to be, and should be viewed as, exploratory; it did not attempt to pose and test hypotheses, but rather to investigate, probe and describe the diagnostic processes currently employed by teachers.

The purposes of the study:

The first purpose of the study was to investigate the clinical problem solving behavior of classroom teachers as they diagnosed children's reading problems. Toward this end, 10 teachers were asked to interact with two simulated cases of reading difficulties in a laboratory setting. An observational session was held, during which the teachers were instructed to gather information about a case and to verbalize their thoughts as they attempted to reach diagnostic decisions about the case's problems. During a debriefing session that followed, techniques of stimulus recall were used to stimulate the teachers' memory of how they attempted to diagnose the case. Among the research questions posed were:

1. What are the diagnostic judgments most frequently mentioned by teachers about a given case?

2. To what degree do teachers arrive at similar diagnostic judgments about a child's reading problems?

3. Do teachers spend similar amounts of time diagnosing a case of reading difficulty?

4. What are the most frequently collected cues about a given case?

5. What kinds of relationships exist between cues teachers collect and the teachers' verbatim comments about these cues and the case?

These questions (particularly No. 1,2, and 4) are based, in part, on an Agreement Corollary derived from a theory of clinical problem solving behavior named the "Inquiry Theory" (Vinsonhaler, Wagner & Elstein, 1977). The agreement corollary states that, the greater the similarity of teachers' "memories", the greater the agreement of their diagnoses. For a complete discussion of the Inquiry Theory and the agreement corollary see Chapter II, pp. 55-62.

A second purpose of the study was to explore the similarities between teachers' diagnostic practices in experimental situations and their practices in the natural classroom environments. Interviews were conducted with the 10 teachers in their own classrooms. The interviews were designed to provide information about the teachers' instructional, diagnostic, and remedial practices in the classroom. Using a standardized interview-form, the researcher asked the teachers to match their students with descriptions of reading difficulties (one student to one description), and to describe how they had determined the students' reading problems and what remedial actions they had taken. Specific research questions included:

1. What are the diagnostic categories most frequently mentioned by teachers in the classroom?

2. To what degree do teachers mention similar or different diagnostic categories in laboratory and classroom situations?

3. To what degree do teachers formulate similar or different remediation plans across two cases or reading difficulties?

Significance of the Study

Little is known about the effectiveness of classroom teachers in diagnosing and remediating reading difficulties. A review of the literature reveals a lack of empirical research in this area and an absence of descriptions of the teachers' diagnostic processes.

The data from this study should add to our understanding of the clinical problem solving behavior of clinicians. The study should also help researchers plan and execute further research on clinicians' cognitive processes. And, it should help teacher educators seeking methods for training inservice and preservice teachers in diagnostic and remediation skills.

Rationale for the Study

Many of today's students have reading deficiencies which may lead to severe learning and emotional problems. Early identification is essential to remediate these problems and to prevent them from becoming more serious. Because reading specialists usually treat only the more severe cases of reading difficulties, the task of early identification must be given to classroom teachers, who interact with and observe the students' reading behavior on a continuous basis. This study should serve as a first step toward determining how teachers might be trained for this role.

Overview of the Study

A review of the literature pertinent to this study is presented in Chapter II. The review focuses on two areas: (1) the nature of reading diagnosis and its implications for classroom teachers, and (2) recent studies of clinical problem solving behavior in reading diagnosis upon which the present study is drawn.

Chapter III is devoted to a discussion of the research design and methods of the study. Data, treatment of data, and results are presented in Chapter IV.

A summary, conclusions, applications for further research, and implications for teacher education are provided in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The purpose of this chapter is to review the
current literature on reading diagnosis. Two major
areas will be discussed: 1) the nature of reading
diagnosis and its implications for classroom teaching,
and 2) recent studies of clinical problem solving behavior
in reading diagnosis conducted by the Clinical Studies
Component of the Institute for Research on Teaching at
Michigan State University upon which the present study
is drawn.

Nature of Reading Diagnosis

Place of diagnosis in the teaching-learning situation

Although there is an abundance of books and papers
about reading instruction, not a great deal is yet known
about reading problems, their causes and remediation
(Smith, Carter & Dapper, 1970, p. 1). Nor, it seems, do
researchers know enough about the developed skills of the
fluent reader (Smith, 1971). The general notion, however,
is that reading is a more complex process than was
originally believed (Sawyer, 1974).

9

Many educators also seem to feel that, since reading is a complex process, the teaching of reading, reading diagnosis and remediation are all parts of one interrelated process. The section that follows concentrates on the diagnostic aspect of reading; specific attention will be given to the importance of diagnosis, definitions of the process, and its effectiveness, as suggested by the literature.

Importance of reading diagnosis

Review of the literature reveals that most educators consider the diagnosis of reading performance an essential and integral part of reading instruction, and a basis of all efficient teaching (Otto, McMenemy & Smith, 1973). Moreover, because the reading process appears to be complicated and reading failure may be attributed to many compounding factors (Satz, 1977), some educators acknowledge the need for an interdisciplinary approach to diagnosis (and to research on reading in general) (Weintraub & Farr, 1976). This interdisciplinary approach, they argue, should focus attention on the individual child and his or her learning problems, and should be carried out by professionals from various fields (e.g. psychiatrists, psychologists) and educators who occupy various positions within the school system (administrators, principals, reading consultants, and classroom teachers) (Kress, 1965; Smith, Carter & Dapper, 1970; Hollingsworth, 1970; C.W. Peters, 1977). The diagnostic process, some maintain, should start in the

classroom, because "diagnosis is an essential aspect of teaching and a preliminary step to sound instruction" (Sheldon 1968). Therefore, it is argued that teachers be "armed with the diagnostic and remedial techniques necessary to instruct students as effectively as possible" (Wilson, 1977, p. 1). Thus, the teacher is viewed not only as reading-instructor, but also as diagnostician, who constantly studies the reading strengths and weaknesses of students in order to improve instruction (Bond & Tinker, 1967).

Why do so many educators view the diagnostic act in reading instruction as so important? Furthermore, why do they place such heavy emphasis on classroom diagnosis (rather than leave the diagnosis to the reading specialist)? Review of the literature suggests several reasons:

First, there is an increasing number of students with reading difficulties, on the one hand, and a small number of reading specialists, on the other, making it impossible to refer all children with difficulties to specialists. Therefore, it is important that classroom teachers develop the necessary diagnostic and remediation skills to detect and help children with reading difficulties, and thus reduce their number (Gallant, 1970); specialists will be able to handle the number of students referred to them only if the classroom teacher assumes major responsibilities in diagnosis (Wilson, 1977).

Second, it is essential that reading difficulties be detected and corrected as early as possible (Sheldon, 1965), so that they will not become more complex (Bond & Tinker, 1967; McCarthy, 1971; Rabinovitch, 1965). The basic assumption here is that "the earlier the problems are discovered, the more hope there is for conquering them" (Smith, 1969, p. 15).

Third, there is a notion that reading is an important enough skill that every phase of the academic career of the poor reader, and his adjustment to his environment and peer-group is directly or indirectly affected by defective reading ability (Sherman, 1968; Stevens, 1971); if this is so, diagnosis and remediation of reading difficulties can enhance a child's concept of himself.

Fourth, reading diagnosis should help teachers plan and modify instruction to meet the needs of individual students (Austin, 1965; Bond & Tinker, 1967; Dauzat, 1977; Dietrich, 1972; Farr, 1971; Karlsen, 1976; Olson & Dillner, 1976; Sawyer, 1968; Swalm, 1973).

The assumption underlying the arguments for classroom reading diagnosis (rather than clinical diagnosis) is that since classroom teachers have relatively long and extensive acquaintances with their students, they are in an optimal position to diagnose the students' reading performance through observations and informal tests (Wilson, 1977).

Efficacy of diagnosis

Although the prevailing assumption throughout the
literature is that reading diagnosis is an essential part of
instruction and remediation (e.g., "individualized diagnosis
leading to prescriptive treatment is a widely accepted and
acclaimed approach to reading disorders" [Bateman, 1971]),
the literature largely ignores two important considerations:
first, whether early and accurate diagnosis actually promotes
effective remediation, and second, whether the remediation
does, in fact, help the retarded reader. If it does not,
one must ask, of what value is the diagnosis?

Spache (1976) maintains that diagnosis is not always
relevant to remediation, and attributes this problem to two
conditions: (1) "the presence of biased or prejudiced
thinking resulting in limited diagnostic efforts or in
stereotyped remedial programs," and (2) "the differing
emphases in the training of clinicians, who are apt to do
the diagnosis, and of remedial or classroom teachers, who
are prominent in remedial work" (p. 436). In other words,
Space claims that the procedures used in remediation
efforts are not directly related to the detailed diagnostic
findings. In many cases, he says, it appears that the two
processes are carried out by different personnel who do not
communicate sufficiently with each other. He recommends
that treatment procedures be more closely related to
diagnostic findings.

Theoretical work dealing with the associations between diagnosis and remediaton is not the only thing missing from the literature; there is also an obvious lack of empirical research in this area. Bateman (1971) states that a detailed diagnosis of a student's reading performance should yield data on what she/he needs to be taught, and how she/he should be taught. "The question of whether diagnosis makes a difference," Bateman adds, "must be rephrased in terms of which diagnostic data make a difference for what purpose." She notes that there are conflicting opinions about the efficacy of diagnosis and little conclusive research to clarify this issue.

Discussing the value of diagnosis to the remedial act, Della-Piana (1968) cites three studies, conducted over a period of 33 years, which provide data about the relationship between diagnosis and remediation. The first study, by Monroe (1932), dealt with procedures for systematic diagnosis leading to specific remedial acts. Thorough diagnoses were conducted with children who exhibited specific reading deficiencies. Taking into con-sideration the students' age and I.Q., Monroe compared their reading achievement with their skills in other areas, such as math and spelling. Educational profiles were created for each child which assisted the researcher "in understanding the child's problem of maladjustment by indicating the magnitude of the discrepancy or lack of harmony between his accomplishments" (p. 33). Results showed that remediation

based on such an extensive diagnosis yielded significantly greater gains than ordinary school instruction. The direct associations, however, between the thorough diagnosis and the remedial gains were questioned by Monroe herself. The educational profile, she said, "does not help directly in understanding the causative factors involved in the defect,...it does not assist directly in the selection of remedial methods, although it indicates in some cases discrepancies between the reading skills which offer a point of attack. The reading index sets a goal toward which to work in applying remedial instruction and gives a satisfactory means of measuring the improvement brought about by the corrective work" (p. 33).

The second study, by Robinson (1946), demonstrated that thorough diagnosis, followed by remediation, can help many "unteachable" children learn to read. Diagnoses were conducted independently by professionals from various disciplines -- social workers, psychologists, pediatricians, neurologists, etc. These specialists then met to evaluate and plan for remediation. Reading deficiencies had been caused by multiple factors, Robinson found, and the thorough diagnoses helped many of the children learn to read. Although the diagnostic process in this study appeared to be highly valuable, the question remained "whether similar gains could be obtained by small-group teaching, without expensive diagnosis" (Della-Piana, 1968).

A third study, conducted by Glad (1965), provided additional data about the value of diagnosis to subsequent remediation. Results indicated that students who went through intensive diagnosis showed an average gain of 1.4 on an oral reading test, compared with a preremedial yearly average gain of 0.5.

Taken together, these three studies still "leave open the question as to exactly what role diagnosis plays in obtaining reading gains" (Della-Piana, 1968, p. 2). In each study it was unclear whether the thorough diagnosis was the main determinant which effected the high gains.

Many writers believe that diagnosis is necessary to avoid "standardized remediation." The diagnosis, they say, should be oriented toward the student's specific reading problems. However, recent review of the literature on the association between diagnosis and remediation, from 1900 to 1979 (Weinshank, in preparation), reveals that, in general, diagnosis and remediation are far from interrelate and integrate. Some empirical data provided by Weinshank supports this claim. A study examining the relationships between diagnostic decisions made by reading clinicians and their remedial plans concluded that the diagnoses and remediations were only modestly correlated (Weinshank, 1979).

In summary, there is an apparent lack of theoretical discussion and empirical research on the question of whether thorough and accurate diagnosis actually determines the

effectiveness of the remediation. It seems logical to believe that the stronger the link between diagnosis and effective remediaton, the higher the value that can be attached to the diagnostic act.

To enhance the likelihood that diagnosis will promote successful remediation, at least three conditions should be met. First, the diagnosis must be reliable. A reading specialist working with a particular case of reading difficulties should be able to reach similar diagnostic judgments at two different times. One must be aware, how-ever, that even if a reading specialist is consistent in his/her diagnoses, it may be that he/she has consistently reached the same faulty conclusions. For that reason, it is preferable that at least two specialists independently diagnose the same case. If both arrive at similar diagnostic judgments, it is likely that their diagnoses are reliable and accurate.

A second condition under which diagnosis is important is that both the diagnosis and the remediation be specific. It is not enough for a diagnosis to be reliable, it should also indicate the specific areas in which the child experiences reading difficulties. Specific treatments appropriate for the student and his/her cognitive abilities must then be prescribed, rather than some stereotyped treatments recommended for all children and all types of problems.

Finally, the remediation must be relevant and efficacious; that is, it should be directed toward those

specific reading problems identified during the diagnostic act as the cause of the child's reading difficulties. Remediation will be effective to the degree that it is relevant.

Suppose, for example, that the diagnosis reveals that retentive comprehension, one of the four vital signs, is the problem-area for a particular child [The four vital signs are: (1) instant word recognition; (2) decoded word recognition; (3) fluent message segmentation, and (4) retentive comprehension (Sherman, in preparation)]. The remediation would be relevant only if it treated the child's comprehension. The remediation would be irrelevant, and ineffective (although it might still be specific), if it called only for phonic work to treat the problem.

The issue of relevancy incorporates another issue, that of time. How long must the remediation be continued for the reading problem to be cured? If the remediation lasts for an extended period, it might not remain relevant, because the child may begin to fall behind in another area of reading. If, on the other hand, the remediation does not last long enough, the problem may remain uncured, and might eventually become as severe as it originally had been.

If the conditions of reliability, specificity, and relevancy are met, we can argue that reading diagnosis of reading difficulties is indeed valuable, since it is likely to lead to treatment and cure.

The value of reading diagnosis may also be associated with the success or failure of the remedial act. Even when the conditions of reliability, specificity and relevancy exist, if reading remediation does not improve students' reading performance, reading diagnosis may be of no value. If, on the other hand, remediation does show to have effects on students' reading performance, then reading diagnosis, leading to a differentiated (rather than stereotyped) remediation, is important.

The question of whether remedial programs result in long-term or permanent gains for the students is discussed by Spache (1976). He claims that there are several flaws in the traditional ways of measuring students' remedial gains; specifically, he says: (1) different reading tests are not comparable, so dual testing yields incomparable data; (2) different reading tests measure different aspects of the reading performance, so inter-tests comparisons are relatively meaningless; (3) measuring the decrease in gap between achievement level and mental age is also relatively meaningless, because intelligence and reading achievement are not parallel attributes; (4) scores from pre and post tests, used to evaluate short-term remedial reading programs, are faulty because of the phenomenon of regression to the mean. In summary, Spache argues, standardized tests that evaluate remedial outcomes are very narrow and are not reliable.

In a subsequent discussion of the factors that affect the outcomes of remediation, Spache comes to the following conclusions:

1. There does not appear to be any specific amount of time needed for remediation. What is most important is the number of contact hours with the student, which may continue even after the treatment has ceased;

2. The manner in which remediation is conducted -- whether on an individual basis or with a small group (5-6 students) -- does not really matter, because gains are related directly to the number of contact hours with the student and progress is more readily stimulated by frequent sessions;

3. The student's initial reading level when remediation begins is positively related to gains from remediation. Those students with the highest pre-remediation test scores tend to achieve the highest post-training scores;

4. Remedial work with elementary school students can result in significant, short-term gains, whereas secondary school students may show greater long-term profit;

5. The personality adjustment of the retarded reader is a significant aspect of his/her problem and may affect his/her remedial gains. Little is known, however, about the relationships between personality characteristics of the retarded reader and permanent reading gain scores.

Discussion of the factors affecting remedial outcomes leads to an important question: What are the long-term outcomes of remediation? After reviewing 25 follow-up studies, Spache (1976) concluded that "remedial treatment apparently does not affect school progress appreciably, over time" (p. 336). Of 14 studies in which reading tests were administered as part of a long-term follow-up, 12 indicated no continued growth after treatment, and only two showed that retarded readers were functioning at levels normal for their age-grade status. The latter two studies involved secondary school students and college students, which is consistent with Spache's conclusion that secondary students tend to show greater long-term profit than primary grade students.

Overall, Spache concludes that, in general, follow-up studies indicate little or no further development of reading ability as compared to the accelerated rate during the treatment. One of the studies, for example (Buerger, 1968), revealed that "pupils who receive remedial reading instruction demonstrated significant immediate post remedial reading gains", but "did not make greater long-term educational progress than a similar control group". Buerger's conclusion was that "reading disability is, for the most part, a chronic condition needing long-term treatment. What is needed after a rather intensive remedial period is provision for supportive reading assistance during this follow-up period."

Both Buerger and Spache maintain that, although remedial reading temporarily relieves reading problems, there is little evidence of long-term gains from single remedial treatments.

The "chronic condition" mentioned by Buerger, and resultant need for continuous and supportive reading assistance, warrant further discussion. They depict a situation that may be analogous to that in medicine, where we witness two kinds of problems: chronic and acute. Whereas acute problems, such as appendicitis, can be treated and remediated in a single act, many chronic problems, such as allergy, can not be remediated for years, or even in a life-time.

It may well be that in reading, we can establish similar distinctions between chronic and acute problems. Some problems, such as poor use of phonics in contextual reading, might be acute, while others may be chronic, such as poor retentive comprehension resulting from poor cognitive linguistic structures or low interest in reading.

The possibility that chronic reading problems exist, coupled with the evidence of minimal long-term effects of single remedial treatments, emphasizes the need for continued "health-care" in the area of reading diagnosis and remediation. This, in turn, suggests several questions about the manner in which reading problems are currently treated and remediated: What should the role of the reading specialist be? Can reading specialists continue to work with children on an individual basis and for short periods of time only?

How skilled should classroom teachers be to conduct reading diagnosis and remediation on a continuous basis in their classrooms (rather than referring children for short-term clinical work in a clinic setting)? To what degree should the parents be involved in the remedial act?

Further research is needed to determine the proportion of acute and chronic problems in reading. Such research, consisting mainly of follow-up studies, should also investigate some of the questions raised above.

In summary, the literature on reading diagnosis emphasizes the importance of the diagnostic act for the retarded reader. It fails, however, to provide theoretical discussion and empirical data which deal with the association between diagnosis and remediation and which demonstrate whether thorough and accurate diagnosis leads to more effective remediation. The literature is also inconclusive about the long-term effects of remediation. Much research is needed to investigate these two issues.

Ways of defining reading diagnosis

The terms "diagnosis of reading" and "reading diagnosis" are defined in a number of ways in the literature; there does not appear to be a universal definition. The term "diagnosis" is frequently equated with "evaluation" and "assessment" (Bamman, 1970; Harris & Sipay, 1975; Harris & Smith, 1976), where all these terms are taken to mean: identification and measurement of the

students' level of performance in reading. Even when the term "diagnosis" itself is used, it is frequently interpreted in different ways.

The literature reveals that some educators view diagnosis as a process, while others see it as a product. Furthermore, some are concerned with the student's general reading status, while others focus primarily on the student's weaknesses which need remediation.

The definition of diagnosis as a process emphasizes the sequence of tasks the teacher performs to determine a child's reading performance. Wilson (1977), for example, states that "diagnosis implies that the educator will actively search for clues to assist in evaluating the present state of the reader's skill development" (p. 19). Spache (1976) defines diagnosis as a continuous process of proposing hypotheses about a child's performance and testing those hypotheses (p. 9). Guszak (1972) views the process as a sequence of relatively simple determinations of a pupil's reading achievement level, his/her achievement potential, and his/her prominent skill needs. Peters, N.A. (1977) defines diagnosis as an "interrelated process through which a teacher attempts to ascertain the specific strengths and weaknesses of individual students".

Similar definitions are offered by others who view diagnosis as a process, but who emphasize the child's weaknesses. For Harris (1972) diagnosis is "nothing more than the application of a straightforward, common sense, problem-solving approach to the study of children who have

difficulties in reading" (p. 403). The purpose of this problem solving approach, says Harris, is "to find out what is wrong, what caused the difficulty, and what can be done for it". Similarly, Strang (1964) states that "diagnosis puts more emphasis on defining the nature of the individual's reading difficulties and the conditions causing them". Strang notes, however, that diagnosis is also concerned with those positive factors of the child's reading on which one can build a program for remediation.

When diagnosis is described as a product -- as the explanation or description of the child's reading performance -- the description usually focuses on the child's weaknesses and needs; that is, diagnosis is seen as a systematic and rationale explanation of an individual's inability to read (Carter, 1970; Carter & McGinnis, 1970).

Most of these definitions suggest some characteristics of a "good" diagnosis. At the very least, to be effective, diagnosis cannot be a one-time operation. Rather, it should be a continuous process (Otto et al., 1973) which will be combined with instruction and improve reading through the reinforcement of the child's strengths and remediation of his/her weaknesses (Strang, 1964). This continuous process is interwoven with treatment (Smith, 1969; Smith, Carter & Dapper, 1970) and is designed to evaluate students very carefully before instruction begins, and on a regular basis (Sheldon, 1968; Wilson, 1977). The process of diagnosis and remediation should be recycled, as

long as the child fails to respond to the remedial instruction (Bond & Tinker, 1967).

What seems to be missing from the various definitions of diagnosis are (1) the specific factors teachers and reading specialists should be looking for when they try to diagnose a child's reading problems, and (2) the mental tasks performed by the teacher or the reading specialist as they determine the child's reading performance. To say that diagnosis is "problem solving" or a "rationale explanation" does not explain how teachers or reading specialists solve the problem -- how they arrive at appropriate judgments and explanations of the child's reading difficulties. More attention must be given to the manner in which teachers process information they have obtained through observations and the use of various tests.

Levels of reading diagnosis

As we have seen, the term "diagnosis" or "reading diagnosis" is not yet defined in a way that enables one to thoroughly understand the skills involved in the process. Furthermore, the definitions of this term do not draw a distinction between two different kinds of diagnosis -- classroom diagnosis and clinic diagnosis. Rather, review of the literature reveals that educators prefer to talk about levels of diagnosis, which correspond to reading difficulties of different severity.

Wilson (1977) describes three types of diagnosis: informal on-the-spot; classroom, and clinical.

Informal on-the-spot is, as the name suggests, an informal diagnosis of a student's reading status based on teacher's questions or exercises. It is followed immediately by adjustment of instruction; this immediacy may prevent serious reading problems from developing.

Classroom diagnosis is a more formal and planned process which is carried on by the classroom teacher if the adjustments made after the informal diagnosis do not solve the child's problem. The teacher gathers more information by observing the student as he/she reads and through the use of a more specific test of skills. After careful evaluation of this information, the teacher applies the findings to the instructional situation.

Clinical diagnosis is conducted by a reading specialist outside the classroom. The specialist takes precise measures of the student's reading skills and potential through the use of precise testing and evaluation instruments.

Smith et al. (1970) list four levels of diagnosis, identified according to the persons who carry them out: classroom teacher, reading specialist, psychologist and clinician.

Classroom teachers usually have the training necessary to observe their students' strengths and weaknesses. They can use a group test to gain information about the students' reading performance and, on the basis of that information, make immediate instructional adjustments to

build the strengths and overcome the weaknesses. Classroom teachers can also make informal observations of the students' attitudes, willingness to participate in class, articulation and speaking vocabulary.

Reading specialists can analyze the reading process more thoroughly. Using individual diagnostic procedures, they can measure the gap between a student's achievement and ability and suggest specific treatments to overcome whatever weaknesses there might be.

Psychologists and clinicians are called in when it is necessary to go beyond the student's observable strengths and weaknesses and beyond measures of the child's reading level. In such cases, mental and physiological tests might be necessary.

While Wilson and Smith et al. differentiate between classroom diagnosis and clinical diagnosis, most educators do not make this kind of distinction. Rather, they prefer to classify diagnosis according to levels of specificity and, in so doing, they seem to suggest that there is no clear-cut distinction between classroom and clinic diagnosis. Bond and Tinker (1967) describe three levels of diagnosis: general, analytical and case-study. While many children's reading problems need only a general diagnosis, others, few in number, may need an analytical or case-study diagnosis.

General diagnosis is designed "to identify children who are doing relatively poor work in reading as compared with their other achievements" (p. 155). The purposes of

this kind of diagnosis are to gain the information necessary to adjust instruction to the needs of individual students and to locate those students whose problems require more detailed analysis. This information is obtained through the use of group tests and other sources of information available to the teacher.

Analytical diagnosis is a systematic exploration of specific reading strengths and weaknesses. It is intended to locate specific areas of reading difficulties.

Case-study diagnosis is used to deal with those students whose reading difficulties have not been adequately diagnosed by the general and analytical approaches. Under this approach, the diagnostician examines the student's reading potential as well as other physiological and psychological characteristics.

Like Bond and Tinker, Kennedy (1971) has identified three levels of diagnosis: group, individual, and clinical.

Group diagnosis is intended to identify students who have reading difficulties and need corrective instruction. In this approach, students are grouped according to age or grade level and given a series of mental, achievement, and diagnostic group tests. This is the most elementary level of diagnosis and, according to Kennedy, is used extensively by classroom teachers.

Individual diagnosis is designed for those students "who are very slow or those suspected of having problems too difficult to treat in a regular classroom" (p. 102). Here, students take individual tests administered by reading specialists.

Clinical diagnosis is a very thorough and comprehensive process, conducted by educational diagnosticians with the aid of other specialists, such as physicians, psychologists, eye and hearing specialists, etc. At this level, the diagnosis is intended to provide clues to the causes of the reading problems.

Strang (1968; 1969) and Carter and McGinnis (1970) have also categorized diagnostic sequences according to levels of complexity. Strang has identified seven such levels, beginning with description of reading performance by the classroom teacher (Level I) and ending with introspective reports (Level VII), in which the reader is asked to describe the processes he uses in reading selected articles. The five intermediate levels include finding clues to different aspects of the student's behavior that influence his/her reading performance (Level II); analysis of the student's reading process (Level III); identification of the student's mental abilities which underlie success in reading (such as visual memory and association) (Level IV); analysis of personality traits and values (Level V), and neurological examinations (Level VI).

Carter and McGinnis (1970) list four levels of diagnosis: Level I -- identification of the disability, Level II -- more detailed description of the problem; Level III -- identification of the individual's reading needs, and Level IV -- determination of causal factors: the determination of why the individual does what he does.

Otto et al. (1973) feel that the first two levels
of diagnosis described by Carter and McGinnis amount to a
single step, and so they suggest that the diagnostic process
consists of three levels: survey, specific and intensive.

Survey diagnosis is carried out by the classroom
teacher and is designed to uncover the strengths and
weaknesses of the class as a whole, and to identify
individual students who seem to have special instructional
needs. This level of diagnosis involves the use of
class-wide testing and evaluation and attempts to evaluate
the success of the developmental teaching program.

Specific level diagnosis is intended to uncover
the reading difficulties of individual students who were
identified at the survey level. This kind of diagnosis is
carried out by either the classroom teacher or a reading
specialist, depending on time, facilities, complexity of the
difficulty, and the classroom teacher's proficiency in the
use of diagnostic techniques.

Intensive level diagnosis is used for those
individuals with the most severe reading difficulties; it is
designed to discover the basic problems which impede learning.
A complete case-study, usually carried on by a reading
specialist, either in the school or in a clinical setting,
is done to gain a general understanding of the student and
his/her needs.

Monroe (1968) divides the diagnostic process into
two types of analysis: descriptive, in which the examiner
tries to describe as completely as possible the nature of the

student's reading difficulty, and causative, in which the examiner tries to understand the factors that have created this difficulty.

In all of these hierarchical definitions of diagnosis, it is unclear where, exactly, the line falls between class- room and clinical diagnosis and where the clinician starts to diagnose. A careful look reveals that, usually, the lowest levels of diagnosis are carried on by teachers in a classroom setting, while the highest levels call for the services of reading specialists in a clinical setting. What seems to differentiate classroom from clinical diagnosis, then, is the thoroughness of the diagnosis and some of the diagnostic techniques employed. Whereas classroom diagnosis is based primarily on observations and informal testing procedures, clinical diagnosis tends to emphasize more formal and extensive testing (Wilson, 1977). Whereas classroom diagnosis leads to adjustment of instruction, clinical diagnosis results in a detailed description of the child's reading problems and a list of recommendations for remediation; and, finally, whereas classroom diagnosis is a continuous process, clinical diagnosis is a one-time assessment.

Another deficiency of the literature is that it does not deal with the question of how different environmental conditions influence reading and reading problems. A child who experiences difficulties in the classroom setting may exhibit totally different behavior when sent to a reading clinic. The problem then becomes one of diagnosing in one

context area (clinic) difficulties that are exhibited in and
affected by a totally different context area (classroom).
Related issue which also lacks sufficient discussion, is
that of the remoteness of the remediation from the
diagnosis. Not only can the problems observed in a class-
room setting be different from those exhibited in a clinical
setting; it may well be that the remediation does not
correspond to the diagnosis. This is especially likely
when a teacher plans a remediation on the basis of a
diagnosis made in a clinic (by a reading specialist) or,
even more remote, by a psychologist from outside the school.

Nature of reading diagnosis: summary

The literature pertaining to reading diagnosis deals
with three major issues: The purpose of diagnosis (Why),
its content (What) and its methods (How). Table 1
describes this domain of diagnosis in greater detail.

The purpose of reading diagnosis is threefold;
it is (1) necessary for the early identification of
reading problems; (2) a prerequisite for remediation, and
(3) essential for planning, modification, and
individualization of instruction. The content of such a
diagnosis focuses on two areas: skill performance and
causes of reading difficulties and, accordingly, involves
two activities: (1) description of skill performance, and
(2) determination of causality. The methods involve a
continuous process of diagnosis and the employment of one
of three levels of diagnosis corresponding to the severity

TABLE 1.--A comprehensive model of reading diagnosis

WHY DIAGNOSE	WHAT CONSTITUTES A DIAGNOSIS	HOW DIAGNOSE
1. Early identification of reading problems	4. a) Description of skill performance	6. Continuous process
2. Necessary prerequisite for remediation	b) Discrepancy between potential and achievement	7. Classroom orientation Group Informal General
3. Essential for planning, modification and individualization of instruction	5. Determination of causality	8. School orientation Individual Formal-analytical Specific (in terms of description)
		9. Clinic orientation Individual Intensive-case study Specific (in terms of causes)
		10. Interdisciplinary approach

of the problem: (a) classroom, (b) school, or (c) clinic.
It may well be that an effective model of reading diagnosis
should incorporate all of these elements.

Competence of classroom teachers as diagnosticians

Something which seems to be missing from the
literature is a discussion of how an effective diagnosis
and remediation should be conducted. Different educators
express different opinions about the purpose, content and
methods of diagnosis, but their writings tend to be very
general and do not describe how information (Table 1)
should be put together to make decisions about individual
students.

Although there appears to be no comprehensive
description of diagnosis -- of how to process information
after is is collected -- many educational authorities
believe that teachers are qualified to diagnose students'
reading difficulties. They consider classroom diagnosis
an integrative part of effective teaching; in fact, some
go so far as to suggest that all content-area teachers
should be involved in reading diagnosis (Dupuis and
Askov, 1977; Niles, 1965). It might be remembered too,
that some of the diagnostic levels described in the
literature are intended to be carried out by the classroom
teacher. The underlying assumption of the above is, that
classroom teachers are, indeed, capable of diagnosing
students' reading difficulties.

Smith (1969) and Smith et al. (1970) identify two major objectives of reading diagnosis conducted by the classroom teacher: (1) determination of the appropriate instructional level for a given student, and (2) determination of the specific skills the student lacks. The more capable the classroom teacher is of accomplishing these objectives, the smaller the number of students will be who need remedial reading instruction. However, as Smith (1969) says, "part of the classroom teacher's job is to know when a disabled reader needs help beyond that offered in the classroom" (p. 20).

McGinnis (1970) believes that the classroom teacher "can meet the reading needs of 92 percent of the school population. (The teacher) can observe the child in the classroom environment, can identify his problems, and can help him solve them."

Harris (1972) states that "children who have slight to moderate reading disabilities are generally able to be helped considerably by the classroom teacher" (p. 400). To be a diagnostic teacher, Harris (1977) claims, the teacher must (1) know the scope and sequence of the total reading program; (2) be familiar with the materials which foster independent learning; (3) have the support of administrators or supervisors, and (4) be skilled in analyzing pupil needs, organizing the class for differentiated instruction, keeping records, and motivating pupils. Basically, Harris (1974) argues, the reading teacher can be a diagnostician "if the

term diagnostician is defined appropriately, and if the teacher has the knowledge, the facilities and the skills necessary to make diagnostic teaching work."

Ekwall (1976, 1977), who also feels teachers are capable of diagnosing reading difficulties in the classroom, offers some diagnostic guidelines for teachers who work with disabled readers (at any given grade level). These guide-lines are:

1. Gather that amount of initial diagnostic information which falls somewhere between the position that it is good to do a great deal of diagnosis before remediation begins, and the contrast position that it is better to do only enough initial diagnosis to initiate flexible remediation;

2. When deciding upon tests to administer to children, consider each student in terms of the type of problem he/she exhibits and select the tests which correspond to this problem;

3. Administer the tests in a situation that is similar to the actual reading situation.

4. Do not attempt to diagnose those factors for which it is not possible to provide remediation or for which remediation has not proven effective in the past, and

5. Diagnosis for a seriously disabled reader should involve more than an appraisal of educational factors.

Spache (1960) thinks it is possible to conduct clinical diagnosis in the classroom. He defines the

retarded reader as an individual who (1) is behind in a number of reading skills by one year or more, if in the primary grades, or by two years of more if older, (2) is below the reading level necessary for full participation in the reading tasks of his/her peer-group; (3) has had normal opportunities for schooling, and (4) has continued to show this degree of retardation despite corrective efforts over a period of months. Spache argues that the classroom teacher can apply this definition to identify those pupils who have reading problems, and then administer group tests of reading and intelligence to distinguish severely retarded readers from those needing moderate corrective treatments; he also claims that the teacher has the capacity to take further diagnostic steps with those children needing careful diagnosis. These steps include assessment of physical factors, personality, and sociological factors; choice of teaching approach; and administration of informal tests.

In a similar vein, Austin (1965) and Bond (1970) state that classroom teaching should be based on diagnostic teaching. More specifically, they suggest that teaching should be based on an understanding of the reading strengths and needs of each child. This knowledge makes it possible for teachers to adjust their teaching and to "make modifications to correct any confusion before it becomes seriously limiting to a child's future growth in reading" (Bond, 1970). If such modifications were made, only the more severely disabled readers would need more careful diagnostic treatment, which has usually been

provided outsine the classroom setting.

Otto, McMenemy and Smith (1973) believe that
teachers are competent enough to conduct diagnoses in the
day-to-day classroom setting and to take the steps required
for effective corrective instruction. Moreover, they argue,
the competent teacher usually knows how far he can go in
diagnosing students' reading problems and when he/she should
refer them to a specialist. Similarly, Kennedy (1971)
suggests that group diagnosis (Level I) which is "conducted
by classroom teachers, can uncover many of the more common
reading deficiencies" (p. 103). He goes so far as to state
that "identifying students who need help in reading is the
concern of classroom teachers; it is not a function of the
remedial reading staff" (p. 73). Because early identification
and treatment can prevent reading problems from becoming
worse, Kennedy adds, "it is...necessary that each teacher
of reading be prepared to administer a preliminary diagnosis
of their children's reading and be able to present simple
corrective measures which will eliminate many minor and
some major problems" (p. 545).

Smith et al. (1970), maintain that most classroom
teachers have the necessary training to observe the strengths
and weaknesses of students in the areas of vocabulary, word
recognition and comprehension. Consequently, these
educators say, teachers occupy the pivotal position for
discovering reading difficulties, treating them, or
referring the students to reading specialists. Wilson
also claims that the classroom teacher is in the best

position to first notice students' potential problem
areas (Wilson, 1977). Hence, as Smith points out, the
more able the classroom teacher is in preliminary diagnosis
and implementing corrective instruction, the fewer the
students who will need remedial instruction. Accordingly,
attempts have been made by practitioners to identify
teaching skills which seem essential for diagnosing
reading difficulties (Blount, 1973) and to disseminate this
knowledge to teachers (Florida Department of Education, 1977).

As this discussion suggests, for diagnosis to make a
positive contribution to the child, teachers must assume the
responsibility for conducting informal diagnoses in the
classroom setting (Dauzat, 1977; Jan-Tausch, 1971) and
accept the notion that identification and correction of
reading problems is an important aspect of the teaching job
(Smith et al. 1970). It must be remembered, of course,
that a diagnosis made by a classroom teacher is different in
its aims and in its depth from one carried on by a reading
specialist who interacts with a child on a one-to-one
basis (Harris, 1953). For teachers, to carry out their
diagnostic responsibilities, they must have access to rapidly
implemented diagnostic procedures which yield accurate data
(Dauzat, 1977).

Research on diagnostic skills of classroom teachers

Despite the many statments about the teacher's
ability to conduct diagnoses, research on teachers' diag-
nostic skills is still lacking. Acknowledging the need for

such research, Burnett (1963, 1970) developed a paper-and-pencil problem solving test in reading to measure teachers' skills in using diagnostic procedures. Burnett's principal task was to construct a measure which would "be valid in terms of discriminating levels of proficiency at problem solving in the teaching of reading, and would as well hold some promise of providing insight into why individuals differ in proficiency" (1963). The first step Burnett took to establish this validity was to develop problems similar to those encountered in the classroom, problems whose solutions called for operations similar to the operations used by the problem solver in an actual situation.

The test consisted of sets of problems designed to measure teachers' proficiency in the use of diagnostic procedures, at five levels of operation (1963): (1) selection of critical information from a pool of data; (2) selection of a means for securing additional data; (3) interpretation of the data; (4) suggestions on how to improve instruction based on the information collected, and (5) re-evaluation of these suggestions in light of new information provided.

At each of these levels, the examinee was asked to rank four responses in terms of how well they met the specifications called for in the problem. For example, the examinee may have been asked to rank four explanations of a child's reading problem on the basis of how well the explanations fit the information that had been presented.

Three groups were involved in the study: (1) students enrolled in undergraduate elementary education courses; (2) elementary-school teachers, and (3) reading teachers, consultants, and supervisors who met the International Reading Association's specifications for certification as reading specialists.

Results indicated that the reading specialists significantly outscored the teachers at all five levels of operation. However, Burnett (1970) noted, "a shocking finding was that the performance of experienced teachers in terms of mean scores on the problems was only slightly higher than that of students in undergraduate courses".

Burnett acknowledged that paper-and-pencil tests cannot really tell us how effectively teachers might perform in an actual teaching situation. Another shortcoming of these tests is that they did not trace the decision making and thought processes of teachers as they attempt to diagnose children's reading problems.

A 1971 study (Weule, 1971) of practices used in the diagnosis of reading difficulties at the primary school level indicated that teachers' diagnostic skills were inadequate. In the study, a questionnaire was distributed to about 350 classroom teachers in New South Wales. The questionnaire was designed to provide descriptions of reading diagnoses made by these teachers; the information asked for dealt with both stated and actual practice. About 199 of the 350 questionnaires were returned.

While asked to consider their own role in diagnosis and treatment, Weule noted, almost all of the teachers said they felt it is "the teacher's duty and responsibility to diagnose and treat reading difficulties. Many underlined the importance of this task. Many placed the teacher above everyone else in this job, saying that he is in the best position to make the decision required...Many stressed the teacher's role in prevention and early identification". Moreover, Weule said, "seventy per cent of the sample thought they could cope with pupils of average ability who are retarded one year or less in reading achievement. Forty per cent also felt capable of providing adequate diagnosis for the seriously retarded, average ability child. Fifteen per cent felt capable of providing adequate diagnosis and treatment for disabled readers, and thirty per cent felt capable of coping adequately with mentally retarded readers". However, many of the teachers talked about "the disparity between what they want to do and what they could do under existing teaching conditions". Many felt there was no time available to provide individual instruction to pupils who needed it.

When asked to rate the relative importance placed on diagnosis and treatment of reading difficulties and other aspects of education and teaching, the teachers indicated that much more emphasis is placed on discipline, pupil-teacher relationships, daily preparation, and so forth.

Weule's conclusions were that "teachers appear to be rather poorly equipped to carry out a crucial part of their task as educators. Their relatively poor knowledge of tests,...the poor use of diagnostic techniques all reflect seriously upon the teacher's knowledge of the children he is attempting to teach. At the present moment most diagnostic attempts appear to be inadequate and ineffectual in providing for successful treatment of reading difficulties."

More recently, Dupuis and Askov (1977) reported on a Content Area Reading Project which examined classroom diagnosis and which yielded more positive results than the Weule study. The hypotheses examined in the Content Area Project were: (1) that informal diagnosis of reading levels is the responsibility of the teacher, and (2) that teachers can use diagnostic information and teach the necessary reading skills without neglecting their content responsibilities.

Sixty teachers were instructed to use a Decision Model for Diagnostic Teaching by Grouping, developed by Cartwright, Cartwright and Yssledyke (1973), which called for them to employ a step-by-step planning sequence in the teaching-learning process. The steps were: (1) careful assessment of each student to determine his/her reading ability; (2) specification of teaching goals for each student; (3) grouping of students according to interests, needs, and abilities; (4) selection of instructional strategy and management procedure for each group;

(5) selection of instructional materials for each group;
(6) implementation of strategy and materials with each
group; (7) evaluation of each student's performance.

After being instructed on how to use the
instructional techniques for carrying out these steps, the
teachers were asked to indicate whether they felt the
techniques were valuable to them or not. Most of their
evaluations were very positive. Moreover, classroom
observations indicated that most teachers did, indeed, use
the instructional techniques which they were taught.

There are at least two apparent deficiencies with
the decision model, however. First, even if teachers are
taught to implement instructional techniques, it is unclear
how they are to make the various decisions necessary for
diagnosis, e.g. how they should go about assessing the
reading ability of each student. In other words, the model
tells them what to do, but not how to do it. Second,
although classroom observations seem to indicate that
teachers do, indeed, use these instructional techniques in
the classroom, it does not indicate how well they use them
in diagnosing students' reading difficulties.

In another recent study Stephens (1978) used a
simulated case of reading difficulty to investigate
teachers' diagnostic skills. The simulated case was based
upon the case history of an eight year-old boy and contained
various diagnostic tests usually administered to individual
children in a clinic setting. The teachers' task was to

interact with the simulated case, to gather and examine information about the child, and to arrive at a diagnostic judgment about his reading problems.

The study included 30 teachers divided into three groups of 10 as follows: Group (1) classroom teachers with training -- experienced elementary school teachers with graduate level instruction in the diagnosis and correction of reading difficulties; Group (2) classroom teachers with no training -- experienced elementary school teachers without graduate level instruction in the diagnosis and correction of reading difficulties; and Group (3) Pre-Service Elementary Education teachers -- pre-service teachers with no full time teaching experience or graduate level instruction in the diagnosis and correction of reading difficulties.

Data analysis included both product and process measures. The product measures were the final diagnosis made by the teachers; the process measures were selected features relating to the manner in which the problems were diagnosed.

The conclusions were that neither graduage level instruction in reading diagnosis nor classroom teaching experience significantly affect teachers' knowledge or strategies of diagnosis. A possible limitation of the study, however, was that the teachers were asked to interact with materials originally developed for the use of reading specialists interacting with children on a one-to-one basis in a clinic situation, and not by

classroom teachers in an actual classroom setting. This
condition may have had a significant impact on the results.

Models of reading diagnosis

If, as the literature on reading diagnosis suggests,
classroom teachers should be diagnosticians, two elements
are needed: (1) models which will more precisely and
accurately describe the aspects of a child's reading
performance and/or the reading process and the factors
which affect reading; and (2) research, based on these
models, which investigates the effectiveness of reading
diagnosis made by classroom teachers.

Presently, in two independent projects, researchers
are working on two such models. One is a Model of Diagnosis,
developed by Dr. Rebecca Barr at the University of Chicago;
the other is a Model of Reading and Learning to Read
developed by Drs. George Sherman and John Vinsonhaler at
the Institute for Research on Teaching, Michigan State
University.

Barr's Model of Diagnosis

The model developed by Dr. Barr is one which
indicates those aspects of a child's functioning level
about which the diagnostician must secure information.
Teachers trained under this model are called upon to
practice diagnoses based on materials which would be
available to them in the classroom for reading instruction
and for diagnosing reading problems. The model makes use

of children's natural language patterns in teaching teachers to make decisions about reading performance.

The Barr model emphasizes the design and modification of instructional objectives appropriate for the child (Barr and Sadow, 1978). Training builds upon the teachers' prior knowledge of reading instruction; it is intended to refine the teachers' concepts and to help them become more effective in their instruction. An important assumption of the model is that teachers do, in fact, possess an ability to process children's natural language, but that they do not have a systematic way to process and organize the information collected to render judgments about reading problems. Accordingly, this approach is designed to train teachers to carefully and systematically observe and record children's natural language in the classroom and to use the information collected for diagnosis and remediation.

Training emphasizes the assessment of three main areas of the child's reading development: reading comprehension, print translation and language concepts. To make such assessments, the teacher must obtain information that reveals the children's level of functioning in the three areas -- oral reading of text or portions of text in the first case; their responses to comprehension questions based on printed text, in the second; and responses to aurally-presented language, in the third. With this information, the teacher determiens the child's strengths and weaknesses within each area. For example, in evaluating a student's proficiency in print translation, the teacher

will use oral reading evidence to draw conclusions about
the number of words the child is able to recognize
instantaneously; his/her knowledge of word components,
including letter sound association; and his/her integration
of this knowledge into a systematic strategy for recognizing
print. Similarly, in assessing a student's comprehension,
the teacher will draw conclusions about the child's ability
to respond to questions demanding recall of stated information,
his/her inferential reasoning from stated information, and
his/her application of concepts to new situations.
Comprehension is viewed as being dependent on print
translation skill and familiarity with the verbal concepts
used by the author of the text.

Barr's model defines diagnosis as a process whereby
the teacher identifies the conditions that interfere with
the child's ability to comprehend assigned or selected
materials. Intervention by the teacher may involve:
(1) instruction in print translation, language concepts,
and/or comprehension, and (2) modification of assigned
materials.

Sherman's Model of Reading and Learning to Read

The major assumption on which Sherman's Model of
Reading and Learning to Read (MORAL) is based is that
the process of clinical problem solving is governed by
the interaction of two factors (Sherman, in preparation):
(1) the clinician's theoretic conceptualization of the

cleint's potential problems and strengths and of possible
cures, and (2) the clinician's actual experience, which is
a major source of the associations between cues and problems,
and between problems and remediation plans. If this
assumption is correct, then the accuracy and clarity of a
clinician's Model of Reading and Learning to Read determines
the consistency and effectiveness of the clinician's
decisions with regard to diagnosis and remediation.

According to Sherman, reading diagnosis is based
on the client's performance on four Vital Signs of Reading:

1. Instant Word Recognition: the ability to recognize
   words without hesitation, measured by relative size of
   sight vocabulary;

2. Mediated Word Recognition: the ability to recognize
   unfamiliar words through the use of graphemic redundancies;

3. Phrase Comprehension: the ability to translate groups
   of words into cognitive structures with semantic
   meaning and to retain these structures briefly, and,

4. Retentive Comprehension: the ability to retain the
   results of perceptive comprehension and to organize
   these results into more complex semantic structures
   suitable for long-term retention, complex inference,
   and problem solving.

Sherman's MORAL holds that the performance level
of a client on most reading activities is a probabilistic
function of performance levels on these four fundamental
reading tasks. Therefore, it seems that one of the

components of reading diagnosis should be the description of a child's performance in these four areas. For many teachers, and some clinicians, establishing the child's levels of performance on the four vital signs is the diagnosis.

Sherman argues that diagnosis must proceed beyond mere surface indications of vital signs. The diagnostician, he says, must attempt to associate each vital sign with specific effectors (causes), such as subskill prerequisite knowledge and specific learning paradigms (e.g., assumptions about learning) and with specific causal factors (e.g., observable and sometimes manipulatable characteristics of the client and his/her environment). Sherman's belief is that each Vital Reading Sign performance level can be improved if the diagnostician has an understanding of the different effecting antecedents and conditions of learning. He assumes that the learning necessary to improve each sign is modulated by a different (but not exclusive) set of factors.

The different antecedents of learning for Instant Word Recognition, for example, might be cue discrimination and associative strategies. The conditions for learning might be repetition of recognition (practice), motiviation and feedback.

The effecting child variables may be inferred from the Learning Paradigm. They are characteristics of the client and his/her environment which influence Antecendent

Processes and Learning conditions. There are three groups of such factors: Child (e.g., cognitive and affective factors); School (e.g., academic length of interaction, regular training given to students), and Home (e.g., the student's language environment).

In summary, Sherman's Model of Reading and Learning to Read implies that effective clinical diagnosis and remediation is determined by the clinician's theoretic conceptualization of reading as well as his actual experience. Diagnosis, according to Sherman, should proceed beyond mere examination of the four vital signs and consider the various antecedents and conditions for learning associated with the child's performance on each of the vital signs.

The literature on reading diagnosis: conclusions

The purpose of this section has been to review the current literature on reading diagnosis with emphasis placed on that information which is pertinent to the objectives of this study. Conclusions suggested by this review are as follows:

1. Most educators seem to agree that reading diagnosis in the classroom is an integral part of the teaching-learning process and is a prerequisite to effective teaching.

2. Educators agree that reading difficulties tend to hinder students' intellectual and emotional development. Thus, early and continued classroom

diagnosis designed to prevent reading problems from developing is fundamental.

3. The term "reading diagnosis" has different connotations; e.g., process vs. product; state of a child's reading performance vs. weaknesses. Furthermore, there appears to be several levels of diagnosis (e.g., classroom, school, clinical) used to identify and help groups and individuals with reading difficulties; the level used depends upon the severity of the problem. The line, however, between classroom diagnosis and clinical diagnosis is not well drawn. Moreover, neither the definitions of reading diagnosis nor the description of its levels describe the mental tasks performed by the diagnostician. Overall, what seems to be missing is a comprehensive model of reading diagnosis which would put together all the elements that should be involved in an effective diagnosis.

4. An implicit assumption implied throughout the literature is that classroom teachers are capable of diagnosing students with reading difficulties. (Some educators even argue that teachers should be accountable for such a diagnosis). There is little empirical data, however, to confirm or disconfirm this notion.

In general, the literature fails to provide an adequate description of the diagnostic processes employed by classroom teachers, nor does it provide substantive empirical evidence of the competence of classroom teachers in reading diagnosis.

The present study attempted to respond to these two deficiencies by providing comprehensive data about teachers' diagnostic skills. The data was obtained through investigation of the problem solving behavior of classroom teachers as they interacted with cases of reading difficulty. By using this approach we also sought to describe the mental tasks involved in the diagnostic process.

This study was one of a series of interrelated studies of clinical problem solving behavior in reading diagnosis that are being conducted at the Institute for Research on Teaching (IRT) at Michigan State University. A discussion of the general research project will provide the reader with a better understanding of the present study, and a framework with which to examine it. This discussion may also be viewed as an introduction to the third chapter on design and methodology.

Clinical Studies of Reading Diagnosis at the Institute for Research on Teaching

Introduction

The present study is a part of a series of investigations of the process of effective reading diagnosis and remediation which was begun three years ago by the Clinical Studies Component of the Institute for Research on Teaching (Gil et al., 1979). These studies are based on a theory of clinical problem solving known as the "Inquiry Theory" and have two general objectives:

1. Better understanding of clinical problem solving
   behavior of reading clinicians and classroom teachers;
   and

2. Application of research findings to the training of
   teachers and reading clinicians in diagnosis and
   remediation skills.

Three different forms of studies are being
conducted (Gil, Vinsonhaler and Wagner, 1978):

1. Observational studies, in which reading clinicians or
   classroom teachers were observed as they interact with
   simulated cases of children with reading difficulties;

2. Computer simulation studies, in which the implications
   of the Inquiry Theory are explored by programming
   computers to simulate the diagnostic and remediation
   behavior described by this theory. (These "simulated"
   clinicians reflect both ideal and typical approaches
   of reading clinicians to diagnosis and remediation).

3. Training studies, in which instruction in reading
   diagnosis and remediation in classes is guided by
   the Inquiry Theory concepts. Students enrolled in
   the classes interact with simulated cases of children
   with reading difficulties, and are guided by computer-
   based decision aids, to improve their diagnostic skills.

The Inquiry Theory

The Inquiry Theory is a theory of clinical problem
solving, which originated in the medical education research

56

"Inquiry Project" conducted at Michigan State University by Arthur Elstein and Lee Shulman (Elstein, Shulman, and Sprafka, 1978). It was refined by the Clinical Studies group at the Institute for Research on Teaching and has come to be known as the "Inquiry Theory" (Vinsonhaler, Wagner, and Elstein, 1977).

The Inquiry Theory describes the behavioral domain in which a clinician (e.g., a physician, a reading specialist, a teacher) interacts with a case (e.g., a patient, a student) to reach diagnostic and treatment decisions about the case's problems.

By describing this behavioral domain, the Inquiry Theory attempts to predict those characteristics of the clinical interaction which will occur (and be observed) over and over again.

The theory holds that clinical diagnosis, or clinical problem solving, is determined by the interaction of clinical memory (consisting of sets of problems, cues, treatments and the relationships among them) and clinical strategy (the sequencing of the mental tasks performed by the clinician), and the case.

Six information processing tasks characterize the clinical encounter between a clinician and a case:

1. Cue acquisition -- gathering of data, beginning with initially available cues.

2. Hypothesis generation -- formulation of alternative assumptions about the case's problems based on a limited number of cues.

3. Cue interpretation -- interpretation of the data based
    on the cues collected and the hypotheses under
    consideration.

4. Hypothesis evaluation and diagnositic judgment --
    estimation of the likelihood of each hypothesis in
    order to reach a diagnostic judgment.

5. Treatment evaluation -- estimation of the expected
    gain for each of the possible treatments in relation
    to the diagnosis.

6. Prescription selection -- selection of the specific
    methods of remediation on the basis of the possible
    treatments.

The agreement corollary

As stated, the Inquiry Theory holds that clinical
problem solving behavior is a function of the clinician's
memory and strategy. This assumption suggests the following
agreement corollary: If diagnosis is determined by clinical
memory and strategy, then similar memories and strategies
will result in similar diagnoses.

According to the agreement corollary, memory and
strategy are determined, in part, by the training
clinicians receive. The more similar the clinicians'
training, the more similar their memories and strategies
will be, and the more closely they will agree when
diagnosing the same cases of reading difficulties. To
the extent that their training varies, the clinicians will

employ different "memories" or "models" of the reading process, and will show limited agreement in their diagnostic judgments.

Suppose, for example, that for reliability reasons, two teachers, with different training backgrounds, are asked to independently diagnose the same case of reading difficulties. Assume that one teacher operates from a skill-model orientation, the other from a socio-psychological model. Both teachers will use the same initial informal reading assessment procedures, such as analysis of school records and oral reading, to evaluate the case's reading performance. Their different training background, however, will affect their subsequent choice of information about the child's reading performance. The first teacher will tend to collect information relevant to his/her skill-model orientation, such as the child's ability to chunk, analyze, and identify words, while the other will probably seek socio-psychological information, such as psychological reports, the social-worker's comments about the child, and home background. The differences in the information collected will probably lead the teachers to different diagnostic judgments about the child's reading problems.

The following is a list of possible diagnoses which the two teachers might entertain. (In other words, it is a list of some of the diagnostic categories "stored" in each teacher's memory, based on, and derived from, the training the teachers have received):

Skill orientation	Socio-psychological orientation
poor phonics*	low interest in reading*
poor word analysis	poor visual acuity
poor oral reading*	reads below grade level*
poor comprehension	poor auditory acuity*
poor sight words*	inadequate verbal ability
reads below grade level*	no intellectual models of reading at home

Suppose the asterisk (*) indicates those
diagnostic judgments each teacher made about the child,
based directly on the model from which he/she operates.
A careful look at these judgments indicates that, although
each of the teachers might have mentioned some of the child's
problems, their diagnoses cover only a small part of the
child's reading performance. The skill-oriented teacher,
for example, mentioned "poor phonics" as a problem area,
but did not suggest a possible cause for this problem,
which may be "poor auditory acuity" (mentioned by the
second teacher). She/he also failed to identify the cause
of the child's "poor sight words," which may very likely
be "low interest in reading" (mentioned by the second
teacher).

Teachers' diagnostic agreement can be determined
by various statistical procedures, such as calculation of
the proportional agreement statistic, commonality score, or
inter-clinician coefficients (See Appendix I: Observational
studies data analysis systems [OSDAS] statistics). In this
instance, the inter-clinician phi coefficient yields a score

of around 0.0, meaning that the two teachers showed almost
no agreement in their diagnoses of the child's problems; of
a total of seven diagnoses mentioned by the teachers, only
one ("reads below grade level") was made by both. This
limited agreement is a result of the different kinds of
training the teachers received. The teachers developed
different "memories" about reading and reading deficiencies,
and they considered only those factors that could be
derived from the narrow list of categories stored in those
memories.

It should also be noted that neither teacher's
diagnosis, considered separately from the diagnosis made
by the other teacher, was sufficiently reliable to form
the basis for remedial plans for the child. A combination
of their diagnoses would probably be more accurate,
comprehensive, and reliable, and lead to more effective
remediation.

The agreement issue is an important one for all
professions in which clinicians must make diagnostic
decisions about their clients. The importance of the issue
stems from the assumption that the higher the clinicians'
agreement about a patient's problems, the more likely it
is that they have reached accurate and reliable diagnoses
(which, in turn, may lead to appropriate treatment).

The question of agreement is especially important
in medicine, where incorrect diagnosis can result in
permanent damage to the patient, and, in some cases, even
in death. Because of the seriousness of the issue, many

studies have been conducted to investigate inter-physician agreement. Several investigations have revealed that "a surprising and clinically important degree of inaccuracy is to be expected in the interpretation or evaluation of many clinical and laboratory procedures used in every day practice" (Garland, 1959). For example, writes Garland, "experienced interpreters of a series of plain chest roentgenograms are apt to miss about 30 percent of those films positive for roentgenologic evidence of disease, and to over-read about 2 percent of those negative for disease. Further, in evaluating pairs of serial roentgenograms for alternations in the status of disease, one experienced physician is apt to disagree with another in about one-third of the cases, and (on review) to disagree with himself on one-fifth of them. Comparable degrees of error occur in many forms of clinical practice. Indeed, if all branches of medicine could be tested, the phenomenon would probably be found quite universal".

Studies by other researchers support Garland's statements. In an examination of the reliability of chest radiography in the diagnosis of pulmonary lesions, Yerushalmy (1955) found that an individual physician agreed with other radiologists on only about 30 percent of the x-rays. Yerushalmy concluded that "observer error in chest radiography is of such magnitude as to create special problems in diagnosis and treatment." In another study, Paton (1957) found that "the accuracy rate in the diagnosis of myocaridal infractional is surprisingly low,

only 44 percent."

Given the importance placed on diagnostic agreement in medicine, it seems logical that this is an important consideration in reading diagnosis, as well. For this reason, a major part of the data collected in the present study deals with teachers' diagnostic agreement.

Case simulation

Observational, computer simulation, and training studies of the clinical encounter and the tenets of the Inquiry Theory all involve the use of simulated cases of a client's problems. (A case is a set of information that the clinician can collect). These simulated cases are based on actual clients and represent the relevant characteristics of the client's problems.

Two types of simulated cases have been developed: manual based and computer based. The manual based case consists of various kinds of information about a child's reading performance (e.g., background data, school records, results of different tests that the child took, etc.) which are stored in a box and retrieved manually. The computer based case involves the same information, but it is stored in a computer file and is retrieved via computer terminal.

The use of simulated cases in studies of reading diagnosis is desirable for several reasons: (1) they provide a means for presenting the child's behaviors to the clinicians; (2) they allow for replications of the clinical encounter with the same case (and with the same or

different clinicians), so that an acceptable level of
objectivity can be achieved; (3) they may prove to be a low
cost tool for training clinicians in diagnosis and remediation
skills; and (4) they may prove to be an effective tool for
training clinicians and educators on diagnostic skills
under immediate feedback.

Following is an examination of the three types of
studies designed to investigate the clinical problem solving
behavior of reading specialists and classroom teachers in
reading diagnosis. All three are guided by the principles of
the Inquiry Theory and utilize simulated cases as an
experimental tool. The studies which will be reviewed are
observational studies, computer simulation and training
studies.

Observational studies

Several observational studies, other than the
present one, were conducted during 1977 and 1978. The
prime objective of the studies was to investigate the
clinical problem solving behavior of reading specialists
and learning disabilities personnel as they diagnosed
children's learning difficulties. The studies used
manually based simulated cases of learning difficulties.
The general procedure was as follows (Gil, Vinsonhaler
and Wagner, 1978):

1. An observational session was held in which the clinician
   (reading specialist or learning disabilities personnel)
   interacted with a simulated case of learning difficulties

to reach diagnostic decisions about the case. The clinician was given an inventory of information about the case, and was instructed to ask for any piece of information that he/she wanted. An experimenter retrieved the items requested and handed them to the clinician. As the clinician examined this information, the experimenter encouraged him/her to talk aloud and verbalize his/her thinking. In the meantime, a clinical observer (a reading specialist or a teacher with a reading background) sat behind a one-way mirror, managing recording equipment and keeping a precise record of all information requested, the time of each request and the clinician's verbatim comments.

2. Immediately following the observational session, the clinician was instructed to write down his/her diagnostic judgments about the case and to map out a general plan for remediation.

3. A debriefing session was held, during which the clinician was asked to recall his/her problem-solving behavior in requesting and evaluating information about the case.

Each clinician interacted with two simulated cases; the second case was either a replication of the first or a different case. Data analysis consisted of both process and product measures. Process measures included such variables as number of hypotheses generated by the clinician during the session, number of cues (items of information) requested, sequencing, and orgnization of the information.

Product measures focused on diagnostic consistency (how consistent the clinician was in describing reading performances across two cases) and diagnostic commonality (how closely the clinicians agree with themselves and with each other in their diagnoses). Also included in the product measures was a comparison of each clinician's final diagnosis and the criterion diagnosis written by an expert clinician.

Preliminary results from the first study (Vinsonhaler, 1979) indicate that agreement is quite low, both between an individual clinician's performances on alternte forms of the same case, and between his/her diagnosis and those of other clinicians. This means, then, that the reliability of a clinician's diagnosis is low. Furthermore, diagnostic consistency does not appear to be a function of the time spent on a case. Rather, consistency seems to vary with the number of replicate cues (items of information) that a clinician examines across cases. This suggests that clinicians may use a heuristic or a systematic data collection plan across cases.

Computer simulation studies

Computer simulation studies are another means by which knowledge of effective clinical problem solving can be gained. According to the Inquiry Theory, the behavior of a clinician is a function of his/her memory and strategy (Vinsonhaler, Wagner, and Elstein, 1977). Therefore, a

simulated clinician can be created by programming into a computer a memory, a strategy, and the interaction between the two, where changes in memory, in strategy, or in both will be reflected in changes in the simulated clinician's performance.

In computer simulation studies, a simulated clinician interacts with a simulated case of a child with reading difficulties (Gil, Wagner and Vinsonhaler, 1979). Throughout this interaction, the computer uses its memory and strategy to arrive at a diagnosis for a child. In so doing, it uses a process similar to the one applied by human clinicians. The interaction between the computer clinician and a case starts when the computer receives the "initial contact" about the case, which is some basic information about the case's reading status. With this information, the computer proceeds to collect more information, on the basis of which it generates hypotheses about the child's reading problems. Then the simulated clinician collects still more information to confirm or disconfirm these hypotheses. After collecting a certain amount of information about the case, the simulated clinician then begins its final diagnosis.

Different memories and strategies may be used to create different simulated clinicians, which may interact with various cases to reach diagnostic decisions. Analysis of the effects of these diagnostic outcomes would increase our understanding of the clinical diagnostic process, and the information could then be applied to the training of human clinicians.

Training studies

The third kind of study based on the principles of the Inquiry Theory is the training or application study. The prime objective of such studies is to examine the application of clinical problem solving theory in the training of reading specialists and classroom teachers. (The instructional corollary from which this objective is derived states that if clinical performance is determined by the clinician's memory and strategy, then this performance may be improved by alterations in clinical memory and strategy).

One training study (Sherman, 1978), carried on during the summer of 1977, addressed the following questions: (1) can teachers be trained to diagnose reading difficulties in a manner similar to that of effective reading specialists? (2) does the instructional corollary hold for reading diagnosis?

To answer these questions, the performance of 36 students enrolled in a graduate diagnosis course was examined. Instruction was explicitly guided by the principles of the Inquiry Theory. Pre and post tests consisting of two instruments were administered: First, a memory battery association test examined the students' memory of problems in reading. It measured how well the students matched information to cue association (e.g., located specific findings about a child's reading per-formance); how well they matched cue to factor association

(e.g., identified important strengths and weaknesses given a set of findings), and how well they matched factor to cue association (identified important cues in testing hypothesized strengths or weaknesses).

The second instrument was a diagnostic performance test, which examined the students' ability to accurately diagnose simulated cases of reading difficulty. This test consisted of a set of materials designed for use with simulated cases; included in the test were standardized instructions, response forms, and a scoring key, each intended to facilitate the student's interaction with the simulated cases.

In addition to the traditional presentation of course content by the instructor, the students interacted with manual based and computer based simulated cases of reading difficulty, using the materials from the diagnostic performance test. At the end of the course, the students took the memory battery association posttest, and the diagnostic performance test (as they interacted with different simulated cases).

Results indicated that the students did learn to diagnose in a manner similar to that of reading specialists; there was a significant increase in their mean diagnostic score. Results also suggested that the learning of clinical memory seems to be related to the learning of clinical diagnostic performance.

Clinical studies of reading diagnosis: Conclusions

The Inquiry Theory presented in this section and the three kinds of studies derived from it suggest the following:

1. Clinical Problem solving behavior seems to be determined by the clinician's memory, strategy, and the interaction between the two. Therefore, clinical problem solving performance can be improved by providing clinicians with external and training aids to memory and to strategy.

2. Clinical problem solving behavior can be simulated by computer; hence, by altering memory and strategy, simulated clinicians can be created which represent both typical and ideal approaches to problem solving (e.g., with or without heuristics). Human clinicians can then be trained to utilize those problem solving approaches which are found to be effective in the computer simulations.

3. Case simulation appears to be a useful, effective, and low cost technique for training reading specialists and classroom teachers in diagnostic skills.

4. Educators can be trained to make more precise diagnostic judgments given proper training involving simulated cases with feedback.

Summary

An attempt has been made in this chapter to review the literature dealing with two subjects: 1) the nature of reading diagnosis and its implications for classroom teaching, and 2) recent studies of clinical problem solving behavior

in reading diagnosis upon which the present study is drawn.

Examination of the literature in the first area focused on the importance of reading diagnosis, various ways of defining reading diagnosis, different levels of reading diagnosis, and diagnosis made by classroom teachers, including analysis of some pertinent research studies. It concluded with description of Barr's Model of Diagnosis and Sherman's Model of Reading and Learning to Read, which represent two recent attempts to deal, in a more systematic way, with the content and process of reading diagnosis.

The conclusions drawn from this examination of the literature about the nature of reading diagnosis were that:

1. Reading diagnosis is regarded by most educators as an integral part of all teaching;

2. Early and continuous reading diagnosis is essential to prevent reading problems from becoming more severe;

3. Various definitions are attached to the term "reading diagnosis", and the description of levels of reading diagnosis differs from one source to another;

4. The literature fails to describe or to analyze the cognitive processes performed by teachers as they diagnose children;

5. Although many educators call upon classroom teachers to assume the responsibilities of diagnosing and remediating children's reading difficulties, there is a lack of empirical research which might determine teachers' effectiveness in diagnosis and remediation skills.

The review of recent studies of clinical problem solving behavior in reading diagnosis began with a general description of the "Inquiry Theory" and of the utilization of simulated cases in studies of clinical problem solving behavior. It continued with brief description of three kinds of studies derived from the tenets of the Inquiry Theory -- Observational, Computer simulation and Training -- all of which use simulated cases as a research tool.

The conclusions drawn from the review of these studies were that:

1. Clinical problem solving behavior is a function of the clinician's memory and strategy.

2. Clinical problem solving behavior can be simulated by computer;

3. Simulated cases can be used effectively in studies of clinical problem solving behavior, and

4. Educators can be trained to make more accurate diagnostic judgments through interaction with simulated cases.

The implications of this review of the literature for the present study are as follows:

1. If classroom teachers are regarded as diagnosticians, it is essential that extensive research be conducted on teachers' diagnostic skills.

2. Such research should focus on the mental tasks performed by the teachers as they diagnose cases, so that we will begin to understand the diagnostic process; and

3. Simulated cases of reading can be used as research tools in studies of teachers' diagnostic skills and processes.

CHAPTER III

DESIGN AND METHODOLOGY

Introduction

The purpose of this study was to investigate the Clinical Problem Solving Behavior of classroom teachers. There were two main objectives:

1. To examine the clinical problem solving behavior of classroom teachers as they diagnosed children's reading problems.

2. To explore the similarities and differences between teachers' diagnostic practices in experimental and classroom situations.

The Subjects

The subjects of the study were 10 elementary school teachers (all females) who volunteered, for payment, to participate. Because data collection was a lengthy procedure, and because it involved both experimental and classroom situations, the number of the subjects was limited to 10. For this reason, and because of the exploratory nature of the study, a deliberate effort was made to select teachers with different backgrounds to ensure diversity of performance. Five teachers were chosen from a group of teachers trained

in a reading diagnosis course taught by Dr. Rebecca Barr at the University of Chicago; the other five were from the Lansing area.

Chicago teachers have all taken a reading diagnosis course taught by Dr. Rebecca Barr. This course trains teachers to diagnose students' skill level in reading by observing the children's reading behavior and by listening and questioning them. Teachers are given materials which would be available to them in a regular classroom setting and are asked to interact with cases of reading difficulties. The five teachers who participated in this study were selected from a group of eight teachers. Two criteria were used for selecting them: 1) number of years of classroom teaching, and 2) guaranteed employment for the following fall. The second criterion was necessary because the second phase of the study involved interviews with the teachers in their own classrooms.

Lansing teachers: Three of the five Lansing teachers were also participants in another study in progress at the IRT -- the Teachers Conceptions of Reading study, coordinated by Dr. Gerald Duffy. These teachers were asked to participate in the present study during a meeting of all the teachers taking part in Dr. Duffy's project. A fourth teacher was recommended, and invited to participate, by a member of the Clinical Studies group. The fifth teacher was recommended by an experienced teacher known to the experimenter.

To participate in the study, all teachers had to have completed at least two graduate courses in reading instruction, preferably one in reading diagnosis.

The teachers' backgrounds, schools and grade levels taught are summarized in Table 2.

Design

The design of the study called for two phases of research: Phase 1 was conducted during the summer and early fall of 1978 under laboratory conditions. The teachers were asked to interact with simulated cases of reading difficulties and to arrive at diagnostic judgments about the cases' problems.

In Phase 2, carried out during the fall of 1978, the teachers were observed for one reading session in their own classrooms, and then interviewed about reading instruction and diagnostic practices.

The overall design of the study is illustrated in Table 3.

TABLE 2.--Teachers, school and grades background

Teachers	Age	No. of years teaching experience	Degree held	Type of school in which currently teaching	Grade taught	No. of students in class
1	45	13	M.A.	Middle class-Lab school	2	25
2	32	6	M.S.T.	Middle class-Catholic/all girls	9	12
3	42	17	M.S.T.	Low class-Bilingual/Puerto-ricans	3	32
4	31	3	M.A. M.S.T.	Middle class	5	40
5	32	1	M.S.T.	Middle class	3	16
6	37	17	M.A.	Middle class	1	26
7	45	10	M.S.	Middle class	1/2	22

TABLE 2--Continued

Teachers	Age	No. of years teaching experience	Degree held	Type of school in which currently teaching	Grade taught	No. of students in class
8	32	11	M.A.	Low/Middle class	2	22
9	32	9	M.A.	Middle class	4	22
10	33	8	M.A.	Middle class	3	21
Mean or Summary	36.1	8.4	M.A.-5 M.S.T.-3 M.S.-1 M.A. & M.S.T.-1	Middle class-6 Middle class/ lab-1 Middle class/ Catholic all girls-1 Low-middle class-1 Low/bilingual-1	Lower elementary-7 Upper elementary-2 9th grade-1	23.8

TABLE 3.--Overall design of the study

TEACHERS	DIAGNOSIS OF SIMULATED CASES IN LABORATORY SITUATION: JUNE – JULY 1978		CLASSROOM SITUATION FALL 1978	
	SESSION 1	SESSION 2	OBSER-VATIONS	INTERVIEWS
T 1 E 2 A 3 C 4 H 5 E 6 R 7 S 8 9 10	General Instr. Training on a simulated case and a case inventory	Observational session: Case No. 7 or 8 Inventory Form A or B Max= 1 Hr.	Diagnosis & Remediation write-up Max= ½ Hr.	Debriefing session No time limit
		Replica of session 1 with another case Post session interview	Morning observations of one reading session	Classroom interviews about the teachers' instructional, diagnostic and remedial practices in reading

Phase 1: Laboratory conditions

Each of the teachers visited a reading clinic at
two occasions. The Chicago teachers went to a clinic at the
University of Chicago, the Lansing teachers reported to a
clinic at the College of Education at Michigan State University.

At each session, the teacher was asked to interact with
a simulated case and to arrive at diagnostic decisions about
its reading difficulties.

The two cases used were developed by Dr. Rebecca Barr
and were based on two Chicago elementary school students.
They were chosen by Dr. Barr for this study because both
had problems that were representative of reading difficulties
encountered in the public schools by classroom teachers. One
of the students was an eight-year-old girl; the other a
10 year-old girl.

Both cases were built around materials available to
classroom teachers for reading instruction and the
children's natural language patterns. As such, each case
included the following: 1) a copy of the passage that the
child read orally; 2) a tape-recording of the child reading
the passage; 3) an oral transcription of what the child
read; 4) background information about the child and the
school, and 5) transcripts of the child's performance on
various tasks related to the reading passage, such as her
answers to comprehension questions; her definition of a word
presented to her, and her ability to identify a word printed

on the board (See Appendix A for the Case Information Inventory).

The sequence of steps followed during this phase of the study was as follows:

1. A training session was held, during which the teacher was given an introduction about the purpose of the study. Instructions about the procedures to be followed were read, and each teacher was asked to practice with a training case and a training case inventory. (This step was essential to ensure that all teachers understood what they were expected to do, what information in the Case Inventory was available to them, and how they were to use the Case Inventory to retrieve and receive the desired information.) (See Appendix B, Directions for Observational Study.)

2. A one-hour observational session was held, during which the teacher was given an inventory of information available for the case and was instructed to ask for any information she wished to have. The use of a Case Inventory was necessary for two reasons. First, it let the teachers know what specific units of information were available. Second, it helped standardize procedures, including the information available, which in turn helped standardize the teachers' memories. This allowed for a more objective analysis of the data than would have otherwise been possible.

As each teacher examined the information about a case, she was asked to verbalize her thinking. The experimenter who has instructed the teacher retrieved the information requested and handed it to the teacher. Teachers were allowed to keep all items of information requested throughout the session. The experimenter also encouraged the teacher to talk aloud as she examined the information. In the meantime, a clinical observer (a reading specialist) sat behind a one-way mirror, managing the recording equipment and keeping a precise record of all information requested, including time of each request and the teacher's verbatim statements.

3. Immediately after the observational session, the teacher was instructed to write down (1) her diagnostic judgments about the child's reading problems and (2) a general plan for remediation. A time limit of half an hour was set for this activity.

4. A debriefing session (with no time constraint) followed, during which techniques of stimulus recall were used to help the teacher remember her problem-solving behavior in requesting and evaluating information about the case. The clinical observer helped the experimenter conduct the debriefing session.

The teacher was shown each of the items of information she had requested during the observational session. A standard set of questions about the items was asked to explore and clarify her problem-solving behavior.

A second interaction between the teachers and a different case took place several days later. The same procedure was followed as for the first case. In addition, after the debriefing session for the second encounter, a brief demographic questionnaire dealing with the teachers' training experience and teaching experience was administered.

All 10 teachers interacted with the same simulated cases, but in different orders. Five interacted with Case No. 7 first and Case No. 8 second; the others interacted with Case No. 8 first and then with Case No. 7. Two inventory forms were available for each case. The forms were identical, except for the order in which they listed the information about the student. The teachers were given Form A for one case, and Form B for the other. The distribution of cases and inventory forms is summarized in Table 4.

Phase 2: Classroom interviews

During the fall of 1978, each teacher was visited once in her own classroom. There she was observed for one reading session and interviewed about her reading instruction and diagnostic practices (See Appendix C for Classroom Interview Form).

The question on which the interview focused was: How do teachers diagnose children with reading difficulties in the natural classroom situation? Specifically, questions were asked which were designed to explore the teachers' memory

TABLE 4.--Assignment of cases and inventory forms*

TEACHER	SESSION 1		SESSION 2	
	Case	Inventory	Case	Inventory
1	8	A	7	B
2	7	B	8	A
3	8	B	7	A
4	7	A	8	B
5	8	A	7	B
6	7	B	8	A
7	8	B	7	A
8	7	A	8	B
9	8	A	7	B
10	7	B	8	A

*For analysis purposes, the cases were identified as Number 7 and 8, respectively, rather than by the children's names.

and strategy with regard to reading diagnosis.

The interviews proceeded in the following manner:
The experimenter handed the teacher four descriptions of
real children with typical reading problems. Two of the
descriptions were based on the simulated cases the teacher
had diagnosed in the laboratory. The teacher was instructed
to read these descriptions and think of children in her own
classroom who corresponded to them. After she identified
such children, she was asked to indicate which parts of the
descriptions did or did not fit the selected children. This
explanation provided the experimenter with a more precise
idea of the resemblance between the children in the classroom
and those in the description.

The teacher was then asked a set of questions, which
explored how she identified children with reading problems
and how she diagnosed the problems. Each teacher was asked
to describe diagnostic procedures for two children. (See
Appendix D: Descriptions of the four children. Also see
Appendix E, which shows the frequency with which teachers
indicated similarities between descriptions and children in
their classrooms.)

Data Analysis

Data analysis included two major types of measures:
Product and process (Wagner et al., 1979). Product measures
dealt with the outcomes of the clinical encounter between

teacher and case, and included the final stated diagnostic judgements, what cues were collected, etc. Process measures focused on the manner in which the problem was diagnosed, e.g., on relationships between cues collected and statements made about the cues. Analysis was also conducted based on the classroom interviews, to compare teachers' diagnostic processes in both laboratory and classroom situations.

Product measures involve three types of statistics (Vinsonhaler, 1979):

1. The proportional agreement, which is a measure of group agreement. This measure is based on the final stated diagnoses written by all teachers for a given case, or on the list of cues collected by all teachers for a case, and is determined in the following manner: First, a domain of statements (stated diagnoses or cues collected) is defined. Next, the percent of teachers who arrived at the same diagnoses or collected the same cues about a case is calculated. The purpose of this measure is to indicate which diagnoses or cues are most frequently mentioned or collected by the teachers.

2. The commanality score, a measure of how closely an individual teacher and a defined group of teachers agree in terms of diagnostic statements or cues collected for the same case.

3. The inter-clinician agreement correlation, which is a measure of the agreemnt among teachers on the diagnostic

statements or cues collected for a given case. This statistic is calculated as follows: (1) a domain of statements (written diagnoses or cues collected) is defined for a case; (2) those statements appearing in an individual teacher's interaction with the case are identified; and (3) a two by two contingency table is prepared and a Phi coefficient is calculated; the cells in the contingency table include (a) the number of statements mentioned in both encounters; (b) statements present in the first encounter (one teacher) but not in the second; (c) statements present in the second encounter (second teacher) but not in the first; and (d) statements not present in either encounter. (See Appendix I: Observational Studies Data Analysis System [OSDAS] statistics).

Process measures of the clinical encounter between a teacher and a case were made which indicated the manner, or diagnostic process, by which the case was diagnosed. Four measures were selected for analysis in this study:

1. Length of interaction: amount of time (in minutes) that the teacher interacted with the case during the observational session. Time was measured from the point at which the teacher received the initial contact information about the case until she indicated she was ready to write the diagnosis.

2. Number of stated diagnoses: When the teacher indicated

she was ready to write the diagnosis, she was allowed

half an hour to write down her diagnostic statements

about the case.

3. Number of cues collected during the observational session.

    The teacher was allowed to look at the case inventory and

    collect as many cues as she wished. However, she was

    required to ask for them one at a time. This condition

    will allow the experimenter to conduct an exploratory

    investigation of the order in which the teacher collected

    information about the case.

4. Relationships between cues and statements: During the

    observational session, it will be recalled, the teacher

    was asked to verbalize her thinking as she collected in-

    formation about the case. This "thinking aloud" continued

    during the debriefing session. During both sessions a

    clinical observer kept a precise record of the teacher's

    verbatim comments about each of the cues she collected.

    It was thought that the relationships between the

    teacher's verbatim comments and the cues she collected

    might shed light on her diagnostic processes.

    Accordingly, a 10-point scale was devised for

    characterizing the relationships between the teacher's

    statements (verbatim comments) and the cues:

    1) The cue requested confirmed a statement, for example:

        "It confirmed what I suspected that a general weakness

        exists."

2) The cue requested disconfirmed a statement, for example: "I ruled out that concepts are a major problem."

3) The cue requested neither confirmed nor disconfirmed a statement.

4) The statement deals specifically with the cue, for example: "She doesn't use whole words."

5) The statement is a generalization of findings about cues, for example: "Comprehension skills are more of a problem for her (than I thought)."

6) The statement is related to cues in a manner other than the above, for example: "I don't know why she didn't understand."

7) The statement indicates the teacher's method of collecting information about a case, for example: "I wanted to probe the issue of word identification."

8) The statement made has no relation at all to the cue, for example: "Would be a help to me if it wasn't quite so challenging to her."

9) The statement is about remediation, for example: "Should go back to easier level."

10) The statement is about children's reading behavior in general, or about the teacher's philosophy of reading, for example: "sometimes re-reading helps kids to get more information."

88

Comparisons between teachers' diagnostic processes in
laboratory and classroom situations.

Two means of validating the teachers' performance on
a simulated case were used in this study. First, the teachers
were asked to interact with a second case, while the
investigator looked for consistency in performance across the
cases; and second, the investigator studied the diagnostic
processes teachers employed in their natural classroom
situation and looked for similarities and differences between
these processes and the diagnostic processes exhibited in the
laboratory setting.

This second step was very important, because it may
indicate the degree to which teachers' interactions with
simulated cases in the laboratory setting reflect their
natural diagnostic processes. It should be emphasized, how-
ever, that the laboratory phase is essential if one wants to
trace the diagnostic processes employed by teachers.
Observations of systematic cue collection and "thinking aloud"
are not available in a classroom situation.

Comparisons of the diagnostic processes used in
laboratory situations and those used in the natural classroom
setting centered around the following questions: What are
the diagnostic categories most frequently mentioned by
teachers in the classroom? Are there similarities between
the diagnostic categories mentioned by teachers in the

laboratory situation and those mentioned in classroom setting?

Questions relating specifically to classroom interviews were also examined, among these were: What are the remedial approaches offered by teachers in the classroom? How successful do teachers perceive themselves to be in remediating children's reading difficulties in the classroom?

Summary

This study was conducted to investigate the clinical problem solving behavior of classroom teachers in diagnosing reading problems in laboratory and classroom situations. Research was divided into two parts: (1) observation of teachers' interactions with two simulated cases in a laboratory setting, and (2) interviews with the same teachers in their classrooms.

Two major types of measures were used to analyze the data: product measures and process measures. Product measures were concerned with the outcomes of the clinical encounter between a teacher and a case. Process measures were concerned with the manner in which the problem was diagnosed. Comparisons were also made between teachers' diagnostic practices in the laboratory situation and their practices in the natural classroom environment.

The data which were collected, treatment of the data, and results are presented in the next chapter.

CHAPTER IV

RESULTS

Introduction

This study was designed to investigate the clinical
problem-solving behavior of classroom teachers as they
diagnose reading performance in laboratory and classroom
situations. The study involved 10 teachers from the
Chicago and Lansing areas and was conducted in two phases.
In the first part, the teachers interacted with two simulated
cases of reading difficulty in a laboratory situation.
Techniques of stimulus recall were used to obtain recorded
verbatim of the teachers' diagnostic processes (written
protocols of the teachers' "thinking aloud" were also taken,
as were their final written diagnoses about the case). In
the second phase of the study, the teachers were observed
in their own classrooms and interviewed about their
instructional, diagnostic, and remedial practices. The
interviews were audiotaped and transcribed.

Because few investigations have been done of the
clinical problem solving behavior engaged in by classroom
teachers as they diagnose reading performance, no hypotheses

were established for this study. Rather, the study was viewed as an exploratory one, intended to yield a description of the teachers' diagnostic processes.

Data analysis focused on the degree of similarity (and difference) among the memories and models the teachers used in diagnosing the cases of reading difficulties. The theoretical framework on which data analysis was based was the Agreement Corollary, derived from the Inquiry Theory of Clinical Problem Solving Behavior (Vinsonhaler, Wagner and Elstein, 1977).

The Agreement Corollary, it will be recalled, states that, if diagnosis is determined by clinical memory and clinical strategy, then the use of similar memories and strategies will result in similar diagnoses. Memory and strategy are determined, in part, by the training clinicians receive; the more similar the training they receive, the more similar their memories and strategies will be, and the more closely they will agree with each other when diagnosing the same case of reading difficulties. Conversely, if training varies from one teacher to another, the teachers will operate from different "memories" or "models" of the reading process and will tend to show limited agreement in their diagnoses (for a more complete discussion of the Inquiry Theory and the Agreement Corollary, see Chapter II, pp. 57-62).

For purposes of clarification, recall the two teachers, discussed in Chapter II, who employ different memories or models. One, it was said, operates from a skill-model orientation, the other from a socio-psychological model. Because of their different diagnostic backgrounds, they tend to entertain different diagnoses about a case of reading difficulties. The following is a list depicting some of the diagnoses the two might entertain for the same case (in other words, this is a list of some of the diagnostic categories "stored" in each teacher's memory, based on, and derived from, the training teachers received):

Skill orientation	Socio-psychological orientation
poor phonics*	low interest in reading*
poor word analysis	poor visual acuity
poor oral reading*	reads below grade level*
poor comprehension	poor auditory acuity*
poor sight words*	inadequate verbal ability
reads below grade level*	no intellectual models of reading at home

The * indicates the final stated diagnostic judgments reached by each teacher about the case. As seen, they differ significantly. A careful look at the judgments indicates that each teacher mentioned only some of the child's problems. The skill-oriented teacher, for example, cites "poor phonics" as a problem area, but does not identify a possible cause for this problem, which may

be "poor auditory acuity" (mentioned by the second teacher). The first teacher also fails to identify the cause for the child's "poor sight words," which may very likely be "low interest in reading" (mentioned by the second teacher).

Statistcal procedures -- such as proportional agreement statistic, commonality score and inter-clinician correlations -- can be used to calculate the teachers' diagnostic agreement [See Appendix I: Observational Studies Data Analysis System (OSDAS) Statistics]. An inter-clinician Phi coefficient calculated to find the diagnostic agreement of the two teachers in the example, yields a score of around 0.0. This means that the two teachers show almost no agreement with one another about the child's problems. Out of a total of seven diagnoses mentioned by the two teachers, only one ("reads below grade level") is made by both. This limited agreement can be attributed to the teachers' different training background, which have left them with different "memories" about reading and reading deficiencies.

In diagnosing the child's performance, each teacher considered only those factors that could be derived from the narrow list of categories stored in his/her memory. Thus, neither teacher's diagnosis, by itself, is reliable enough to determine the remedial plans to be taken for the child. A combination of their diagnoses would probably yield a more accurate, comprehensive, and reliable diagnosis, which would lead to a more effective remediation.

As mentioned, the Agreement Corollary also applies to the strategies teachers use. In the realm of reading diagnosis, there may be two general and distinct strategies, or ways of reasoning: deductive and inductive. For purposes of illustration, recall the two teachers in the example, one of whom operates from a skill-model orientation and one of whom works from a socio-psychological model. Both used the same initial informal reading assessment procedures to evaluate the student's reading performance (e.g., examination of school records, analysis of audiotapes of the child reading a passage, etc.). They differed, however, in their subsequent cue collection. The skill-oriented teacher, being an inductive reasoner, tested the child on various skills associated with reading, such as the child's ability to chunk, analyze, and identify words. After collecting the information about the case, this teacher concluded that the child lacked sufficient reading skills. The teacher operating from the socio-psychological orientation, on the other hand, was a deductive reasoner; she/he assumed that the child's problems were emotionally-based and thus collected only that information pertaining to the child's personality, such as psychological reports, social-worker comments about the child, and home background.

In summary, it may be stated that due to inadequate and/or insufficient training, different teachers may operate from very distinct, and narrow, models of reading

and the factors that affect reading performance. When diagnosing a given case of reading difficulties, they may operate from different memories and strategies, which will result in very limited agreement about the case's reading performance.

Presentation of Results

The purpose of this chapter is to present the findings of this study, most of which relate to the issue of agreement among teachers. These findings will be presented in three parts;

1. Product measures - which were concerned with the outcomes of the clinical encounter between a teacher and a case,

2. Process measures - which were concerned with the manner in which the problem was diagnosed, and

3. Classroom interviews - which were concerned with teachers' instructional, diagnostic and remedial practices in the natural classroom environment.

Part 1: Product measures

Product measures, which were concerned with the outcomes of the clinical encounter between a teacher and a case, dealt with the teachers' final stated diagnoses and the cues they collected for a given case. The measures were divided into three parts:

1. Proportional agreement - a measure of group agreement
   on diagnoses and cues collected;

2. Commonality score - a measure of the agreement between
   individual teacher and a defined group of teachers in
   terms of diagnostic judgments and cues collected on
   the same case, and

3. Inter-clinician agreement correlations - a measure
   of the agreement of one teacher with another on the
   diagnostic judgments or cues collected for a given case.

   The proportional agreement statistic.--the pro-
portional agreement statistic was calculated by dividing
the number of teachers who stated the same final diagnosis
(or collected the same cues) for a given case by the total
number of teachers who interacted with that case. This
process yielded the percentage of teachers who arrived at
the same diagnostic judgments or collected the same cues
about the case. It also indicated the most frequently stated
diagnoses or cues collected.

   Proportional agreement for diagnostic judgments.--
before any statistical operations were carried out, a list
of total diagnostic judgments was prepared. Included were
all diagnostic judgments mentioned by all 10 teachers for
each case. Categorizing the judgments turned out to be
somewhat of a problem. Many of the judgments were stated
differently, although they were essentially the same,

because there is no generally agreed upon vocabulary for reading diagnosis. To determine which of the differently-stated judgments were, in fact, identical, a senior reading clinician looked at the diagnostic list and omitted all redundant categories. For purposes of reliability, another reading clinician did the same thing, and his list of diagnostic categories was checked against the first clinician. The result was a list of 54 diagnostic categories for Case 7, and 62 for Case 8 (See Appendix F for the diagnostic domain for Case 7 and 8). Proportional agreement statistics were then calculated for the most frequently-mentioned judgments. Table 5 shows these statistics.

The first column in the table lists the diagnostic judgments mentioned by at least 20 percent of the teachers for a given case. The second and third columns indicate the percentage of teachers mentioning each category for Case 7 and Case 8, respectively. For example, the diagnostic category "Endings: Ignores", was mentioned by 50 percent of the teachers for Case 7, but not at all for Case 8.

As the table suggests, in general, the teachers showed a very low level of agreement in diagnosing the cases. Only one diagnostic category for each case was mentioned by five teachers (50 percent of total), and only one, for Case 7, was mentioned by four teachers. Seven categories were mentioned by three teachers, and 16 by two. The rest of the judgments were mentioned by only one teacher.

TABLE 5.--Most frequently mentioned diagnostic categories

for Case 7 and Case 8 and 10 teachers

SELECTED DIAGNOSTIC CATEGORIES	CASE 7 (54 total DX)	CASE 8 (62 total DX)
Comprehension: Poor	.30	--
Comprehension: Adequate	.20	--
Understanding: Good when listening	--	.20
Listening comprehension: Adequate	--	.20
Oral reading comprehension: Good	--	.20
Vocabulary concepts: Adequate	.30	.30
Vocabulary: Weak	.20	--
Oral reading: Skips words	--	.30
Oral Reading: Does not pay attention to punctuation	--	.30
Puncuation: Lacks	.20	--
Endings: Ignore	.50	--
Sight words: Weak	--	.50
Sight words: Good	.40	--
Reversals: Problem area	.20	--
Mispronunciation errors: Did not correct	.20	--
Phonic skills: Weak	--	.30
Beginning sounds; Knows	--	.20
Initial consonants: Strong	--	.20
Syllabication skills: Poor	--	.20
Unfamiliar words: No attempt to sound	--	.20
Vowels: Need work	.20	--
Word attack skills: Lacks	--	.30
Context to help with the unknown word: Does not use	--	.20
Word analysis: Weak	.20	--
Language: No language problems	--	.20
Print translation: Problem area	--	.30

*--denotes 0.00

It should also be noted that only one diagnostic
category ("Vocabulary concepts: Adequate") was mentioned by
as many as three teachers for both cases. All other
categories were mentioned either for Case 7 or Case 8, but
not for both.

Figure 1 shows the percentage of diagnostic categories in the entire diagnostic domain that the different teachers mentioned. The verticle line indicates percentage of total diagnostic judgments made; the horizontal line indicates the number of teachers making these percentages of total judgments.

The figure reveals limited agreement among the teachers on the percentage of total diagnostic judgments they made for both Case 7 and Case 8. For example, 80 percent of the total diagnostic judgments made for Case 7 were made by only one teacher, whereas only 2 percent of the total were made by five teachers. For Case 8, 73 percent of the total judgments were made by only one teacher, and only 1.5 percent were made by five teachers.

In summary, the data presented in Table 5 and in Figure 1 show little agreement among the teachers on diagnostic judgments for either of the two cases.

Proportion agreement for cues.--the proportion agreement for cues was calculated in a manner similar to that used for determining the proportional agreement for judgments. First, a list of all cues collected by all ten teachers for each case was prepared. All redundant cues were eliminated, and a frequency count was made to determine how many teachers collected each cue.

Table 6 shows the proportional agreement statistics for the most commonly collected cues for Cases 7 and 8.
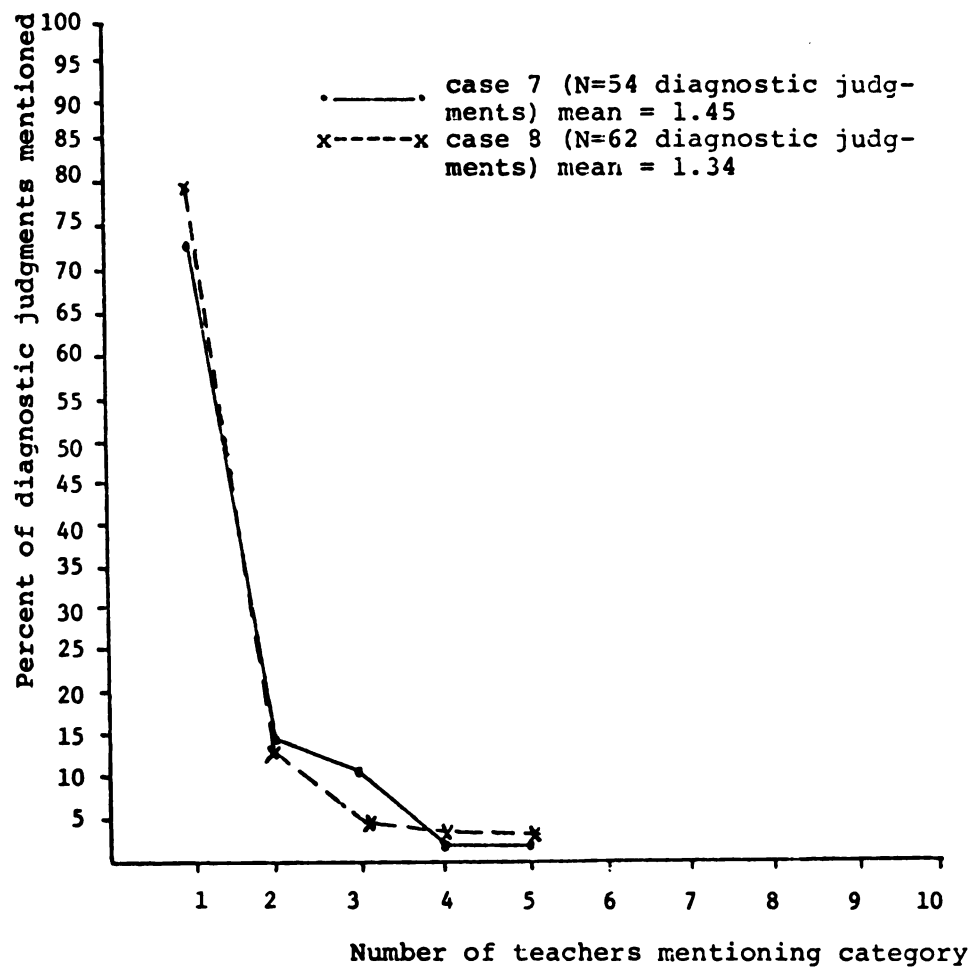
Figure 1.--Percent of diagnostic categories for Cases 7 and 8 and 10 teachers

TABLE 6.--Most frequently collected cues for Cases 7 and 8
and 10 teachers

SELECTED CUES	CASE 7 (221 cues total)	CASE 8 (321 cues total)
Background: Cultural/Home	.90	.90
Background: Student's personality	--	.90
Background: Comments on student reading the passage	.70	.60
Background: Test information	.50	.70
Vocabulary concepts: "Fancy" (in isolation)	.70	--
Background: Reading program	.60	.40
Background: Language development	--	.60
Word recognition: "Simple" (in isolation)	.60	--
Vocabulary concepts: "Detective" (in isolation)	--	.60
Background: Oral reading transcription	.50	.40
Background: Performance in school	.50	--
Background: Picture accompanying the reading passage	.50	--
Vocabulary concepts: "Fancy" (in teacher sentence)	.50	--
Word recognition: "Sammy" (teacher chunk)	.50	--
Comprehension: Oral reading (paragraph 1, list)	--	.50
Comprehension: Oral reading (paragraph 1, question 10)	--	.50
Word recognition: "Everyone" (in isolation)	--	.50
Word recognition: "Detective" (student chunk)	--	.50
Background: School history/description	.40	.40
Background: Description of picture in the passage	.40	--
Comprehension: Oral reading (no paragraph specific, list)	.40	--
Comprehension: Oral reading (no paragraph specific, question 3)	.40	--
Comprehension: Oral reading (paragraph 4, list)	.40	--
Comprehension: Listening (paragraph 4, list)	.40	--
Comprehension: Listening (paragraph 4, question 1)	.40	--
Vocabulary concepts: "Simple" (in isolation)	.40	--
Vocabulary concepts: "Simple" (student chunk)	.40	--
Word recognition: "Sammy" (student chunk)	.40	--

TABLE 6.--Continued

SELECTED CUES	CASE 7 (221 cues total)	CASE 8 (321 cues total)
Comprehension: Silent reading (oral questions & answers, paragraph 1, list)	--	.40
Comprehension: Oral reading (paragraph 1 question 3)	--	.40
Comprehension: Oral reading (paragraph 1, question 7)	--	.40
Vocabulary concepts: "Famous" (in isolation)	--	.40
Vocabulary concepts: "Dosens" (in isolation)	--	.40
Word recognition: "During" (in isolation)	--	.40
Word recognition: "Detective" (in isolation	--	.40
Word recognition: "Picnic" (in isolation)	--	.40
Word recognition: "Plates" (in isolation)	--	.40
Word recognition: "Detective" (teacher chunk)	--	.40

The first column in the table lists the cues collected by at least 40 percent of the teachers for one or both cases. The second and third columns show the percentage of teachers who collected these cues. For example, "Cultural-Home Background" was collected by 90 percent of the teachers, for both Cases 7 and 8. "Word recognition: 'Detective'", on the other hand, was collected by only 40 percent of the teachers, for Case 8 (Background information cues were the only ones selected for both cases; that is, all other cues were slightly different from case to case. The teachers could not, evidently, collect the exact same cue for both cases.)

As Table 6 shows, the proportional agreement for cues collected was much higher than for the diagnostic judgments (Table 5); teachers collected the same cues more often than they arrived at the same diagnostic judgments for a given case. The Case Inventory may have been partially responsible for this result; in providing a specific set of cues it might have increased the likelihood that the same cues would be collected. The kind of organization it offered was not available to the teachers when they made their diagnostic judgments.

As the table shows, background data about the child was the most frequently requested information, across both cases, and cultural-home data was the type of background information most commonly asked for. This might indicate that the teachers depended on socio-cultural data to a great degree in attempting to make decisions about the cases' reading problems. It may further suggest that when the teachers dealt with reading problems, they did not necessarily operate from models which were not directly related to the reading process (e.g., socio-cultural models).

Figure 2 denotes the percentage of all cues collected by the 10 teachers for Case 7 and 8. The verticle line indicates the percentage of all cues collected, and the horizontal line the number of teachers who collected these percentages of cues.

The figure shows limited agreement among the teachers in their use of the 221 cues collected for Case 7 and 321 collected for Case 8. For example, 55 percent of the total
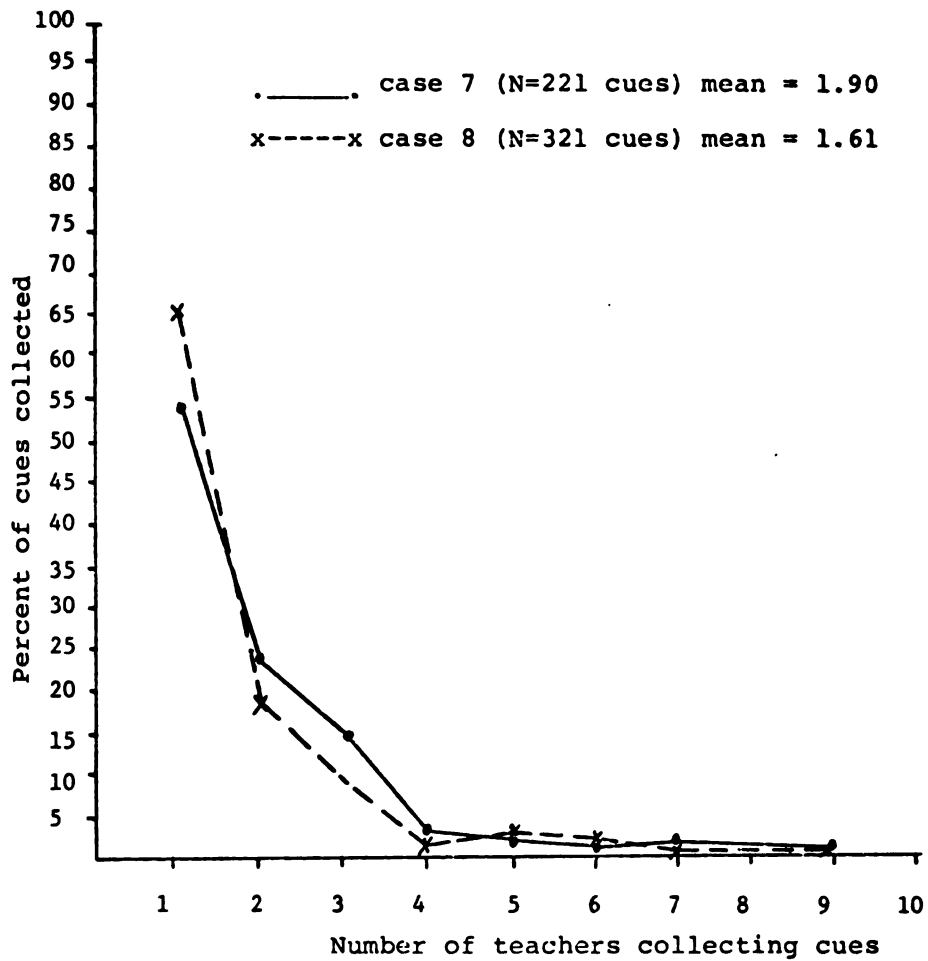
Figure 2.--Percent of all cues collected for Cases 7 and 8
        by 10 teachers

cues collected for Case 7 were collected by only one teacher, while only 5 percent of the total were collected by nine teachers. Similarly, nearly two-thirds of all cues collected for Case 8 were collected by one teacher, and only 5 percent of the total were collected by nine.

In summary, the data presented in Figure 2 show that there was little agreement in cue collection among the 10 teachers for either case.

Commonality score.--commonality scores were calculated to determine the degree of agreement between each teacher's diagnoses and the group of diagnoses made by all other teachers for the same case. The score takes into account which diagnostic judgments, and how many, were made by each teacher. The same analyses were performed with cues collected. Table 7 shows the diagnostic commonality scores for Cases 7 and 8.

The first column in the table gives the representative values of the Phi correlations; the second column indicates the frequency count for each of the values. For example, two teachers for Case 7, and three for Case 8, correspond to the .4 value. The distributions were quite normal for both cases.

The table shows that the mean commonality scores for diagnostic judgments made by all 10 teachers were .45 and .45, for Case 7 and 8, respectively. This means that, on the average, each teacher's diagnosis for a given case

TABLE 7.--Diagnostic commonality score for Cases 7

and 8 and 10 teachers

HISTOGRAM/FREQUENCES CASES = 1-10

MIDPOINT   FOR 6.V6 (Each X=1)

-1.0000   +   X=case 7 mean=.45
-.90000   +   N=10   standard dev.=.29
-.80000   +
-.70000   +   0=case 8 mean=.45
-.60000   +   N=10   standard dev.=.23
-.50000   +
-.40000   +
-.30000   +
-.20000   +
-.10000   +
0.0   +X0
 .10000   +
 .20000   +XX0
 .30000   +
 .40000   +XX000
 .50000   +X000
 .60000   +
 .70000   +XX0
 .80000   +X0
 .90000   +X
1.0000   +

TOTAL   10 (INTERVAL WIDTH=.10000)

included about half of the most frequently-mentioned

diagnostic judgments made by the other teachers.

Table 8 gives the cue commonality scores for Cases 7

and 8.

The first column in the table shows the representative

value for the Phi correlations; the second column indicates

the frequency count for each of the values. For example,

TABLE 8.--Cue commonality scores for Cases 7 and 8

and 10 teachers

HISTOGRAM/FREQUENCIES CASES = 1-10

MIDPOINT   FOR 6.V6 (EACH X=1)

```
-1,0000                     +      X=case 7   mean=.56
-.90000                     +      N=10        standard dev.=.11
-.80000                     +
-.70000                     +      0=case 8   mean=.55
-.60000                     +      N=10        standard dev.=.14
-.50000                     +
-.40000                     +
-.30000                     +
-.20000                     +
-.10000                     +
0.0                         +
 .10000                     +
 .20000                     +0
 .30000                     +X
 .40000                     +0
 .50000                     +XXX00
 .60000                     +XXXX00
 .70000                     +XX0000
 .80000                     +
 .90000                     +
1.0000                      +
```

TOTAL   (INTERVAL WIDTH=.10000)

---

three teachers, for Case 7, and two, for Case 8,

corresponds to the .5 value.

As this table reveals, the mean cue commonality scores

for the two cases were higher than the diagnostic commonality

scores (Table 7). This suggests that, on the average, the

teachers agreed more on what cues to collect than on what

diagnostic judgments to make.

<u>Inter-clinician agreement correlations.</u>--the inter-clinician correlations denoted the agreement between one teacher and each of the others on diagnostic judgments and cues collected for five cases (Phi correlations are the Pearson Product Moment correlations with the assumption that the two variables are dichotomos and not necessarily normally distributed). Specifically, these correlations indicated the degree to which particular cues and diagnostic judgments in one teacher's diagnosis were present in or absent from, another teacher's diagnosis. Table 9 shows the inter-clinician correlations for diagnostic judgments for Cases 7 and 8.

The first column in the table shows the representative value of the Phi correlations; the second column gives the frequency count for each of the values. For example, the frequency count for the .2 value was 3, for Case 7, and 2, for Case 8.

The data in Table 9 indicate that the agreement scores for diagnostic judgments were near zero, for both cases. In other words, on the average, the teachers showed very limited agreement (if any) on their diagnostic judgments.

Table 10 shows the inter-clinician correlations for cues collected for the two cases.

The first column in the table gives the representative Phi coefficient values, the second column the frequency count for each of the values. For example, the frequency count for the .2 value were 6, for Case 7, and 3, for Case 8.

TABLE 9.--Inter-clinician correlations for diagnostic
judgments for Cases 7 and 8 and 10 teachers

HISTOGRAM/FREQUENCIES CASES = 1-45

MIDPOINT   FOR 7.V7 (EACH X=1)

```
-1.0000         +       X=Case 7    mean= -.04
 -.90000        +       N=45        standard dev.= .13
 -.80000        +
 -.70000        +       0=Case 8    mean= -.03
 -.60000        +       N=45        standard dev.= .11
 -.50000        +
 -.40000        +
 -.30000        +
 -.20000        +XXXXXXXXXXXXX00000000
 -.10000        +XXXXXXXXXXXXX000000000000000000000
0.0             +XXXXX000000
  .10000        +XXXXXXXXXX00000000000
  .20000        +XXX00
  .30000        +X
  .40000        +
  .50000        +
  .60000        +
  .70000        +
  .80000        +
  .90000        +
1.0000          +
```

TOTAL   45 (INTERVAL WIDTH= .10000)

As Table 10 indicates, the inter-teacher agreement scores for cues collected was around zero, for both cases. This suggests that, on the average, the teachers showed little agreement in collecting cues for a given case.

TABLE 10.--Inter-clinician correlations for cues collected

for Cases 7 and 8 and 10 teachers

HISTOGRAM/FREQUENCIES CASES = 1-45

MIDPOINT   FOR 7.V7 (EACH X=1)

```
-1.0000          +        X=Case 7    mean= .03
 -.90000         +        N=45        standard dev.= .11
 -.80000         +
 -.70000         +        0=Case 8    mean= .01
 -.60000         +        N=45        standard dev.=.07
 -.50000         +
 -.40000         +
 -.30000         +
 -.20000         +X
 -.10000         +XXXXXXXXX00000000
 0.0             +XXXXXXXXXXXXXXXXX0000000000000000000000000
  .10000         +XXXXXXXXXXXX0000000000
  .20000         +XXXXX000
  .30000         +X
  .40000         +
  .50000         +
  .60000         +
  .70000         +
  .80000         +
  .90000         +
 1.0000          +
```

TOTAL   45 (INTERVAL WIDTH= .10000)

Product measures: Summary

        The product measures presented in this section

suggest the following:

1. Proportional agreement among teachers on both diagnostic

    judgments made and cues collected was very limited.

2. The most frequently-mentioned diagnostic judgments

    differed from case to case. This seems reasonable,

    given that the two cases included different reading

problems and different cues.

3. The most frequently-mentioned cues for both cases were those providing background information. This suggests that teachers may apply models of students' personal characteristics to explain students' reading achievement. Many of the models teachers use, do not seem to deal directly with reading or reading skills; rather, they center around the socio-psychological aspects of reading behavior. A possible explanation for this observation is that teachers usually take many classes in the socio-psychological areas, without focusing on how they affect reading or reading acquisition.

4. Inter-clinician correlations for both diagnostic judgments and cues collected were near zero, meaning that the teachers showed little agreement on diagnostic judgments or on cues collected for a given case. Results across the two cases were almost the same, suggesting that the teachers employed similar diagnostic processes for both cases.

6. On all three measures, agreement on cues collected was slightly higher than on diagnostic judgments made. That is, the teachers tended to show closer agreement in collecting cues than in making final diagnostic judgments.

It must be noted that the results are based on data obtained from a very small number of teachers. But it should

also be noted, however, that the findings are highly consistent across the two cases, and that similar studies, involving reading specialists and learning disability personnel, have provided similar results (Van Roekel, 1979; Vinsonhaler, 1979). Even so, replication studies with classroom teachers are needed not only to check the validity of findings from this investigation, but to determine whether simulated cases accurately represent real classroom cases of reading difficulty.

Part 2: Process measures

A question of interest to the study of clinical problem-solving behavior is how teachers gather information about a case and reach final diagnoses. Specific elements of problem-solving behavior which can be measured and compared include length of interaction, number of cues collected on a case, number of final stated diagnoses for a case, and the relationships between cues collected and teachers' verbatim comments about the cues. The following illustration of a process of diagnosis intends to clarify the way teachers' memories and strategies affect these specific elements of the problem solving behavior.

As noted at the beginning of this chapter, different teachers may operate from different memories and strategies. A teacher who operates from a skill-model orientation, for example, will tend to collect and process information in a manner different from that of a teacher

operating from a socio-pyschological orientation. The first teacher may be an inductive reasoner, the second a deductive reasoner. Differences in memories and strategies, the reader will recall, may be attributed, in part, to different kinds of training teachers received.

Following is an example of the diagnostic process followed by a teacher who operates from a socio-psychological orientation. This example is based on the behavior of one of the teachers (no. 7) who participated in this study.

After receiving initial contact information about the case, the teacher asked for information pertaining to the child's personality. She explained: "I feel children's personality has a lot to do with how they perceive them-selves. It has an effect on classwork". The teacher listened to a tape of the child reading a passage and observed that "she was a very poor reader and made no effort to sound words". The teacher then asked for information about the child's cultural-home background, and explained: "I wanted to see if she was Black. Accented like a Black. Was surprised she was Spanish. My hunch: she's under stress. Might be emotional/social problem, not an intellectual one". The next cue the teacher requested was an audio tape on which the child read the words "Pittsburgh" and "Pennsylvania" (this tested the child's auditory-sound blending). The teacher commented: "She didn't seem to be able to sound out and blend. (However),

sometimes English-as-a-second-language-kids have this
problem. (So), it might be a waste of time to do phonics --
they don't have the same sounds. Silly to try and get them
to do it."

At this point, having collected four cues, the teacher
was not sure what else to ask for. She decided to look at
Test Results and "was very surprised at how well (the child)
did on the tests." The teacher collected two more cues
(written questions and answers for silent reading, and
the word "picnic" in student sentence) after which she
said: "I'm getting swamped here with all this information.
I'm surprised she did as well on tests as she did. Most of
her problem might be emotional/social." The teacher asked
for one last cue -- the eighth (comprehension question
following a silent reading) and said: "Some children can
read silently and comprehend -- that's O.K." The teacher
concluded the session with two stated diagnostic judgments
about the case: (1) that emotional or social problems
might have been hampering the student's school work, and
(2) that she was insecure about herself.

This example of a process of diagnosis illustrated
some of the elements of teachers' diagnostic processes which
can be measured and compared. As mentioned at the beginning
of this section, among those elements are length of
interaction with a case, number of cues collected, and
number of final stated diagnoses made by the teachers.

Teachers' performance on the two cases

Teachers' performance in terms of length of interaction, number of cues collected, and number of diagnostic judgments:

Examining teachers' performances in terms of these variables is one way the researcher can explore some of the characteristics of the teachers' clinical problem-solving behavior. Analyses of process measures for this study were based on data obtained during both the observational and the debriefing sessions.

Length of interaction

Table 11 shows the length of time the teachers interacted with Cases 7 and 8.

The first column in the table represents the length of the interaction, in minutes; the second column shows the frequency count for each of the time variables. The table indicates, for example, that two teachers interacted with Case 7 for 40 minutes, and two interacted with Case 8 for 40 minutes (See Appendix G for raw data on measures of time, cues collected, and diagnostic judgments for the 10 teachers on the two cases.)

As the table shows, different teachers interacted with the cases for different amounts of time. Length of interaction ranged from a minimum of about 25 minutes to a maximum of 60 minutes (arbitrary cut-off time), with a mean

TABLE 11.--Length of interaction for Cases 7

and 8 and 10 teachers

HISTOGRAM/FREQUENCIES	CASE = 1-10		
MIDPOINT	FOR 1. TIME (EACH X= 1)		
0.	+		
5.0000	+	X= Case 7	mean= 41.3
10.000	+	N=10	
15.000	+		
20.000	+	0= Case 8	mean= 48.1
25.000	+XX0	N=10	
30.000	+		
35.000	+XX		
40.000	+XX00		
45.000	+000		
50.000	+XX		
55.000	+X0		
60.000	+X000		
TOTAL	10 (INTERVAL WIDTH= 5.0000)		

time of 41.3 minutes for Case 7, and 48.1 minutes, for Case 8. This finding suggests that, as with most other psychological variables (which were investigated in various studies), teachers' interactions with simulated cases reveal marked individual differences.

Number of cues collected

Similar individual differences were found in the number of cues the teachers collected. Table 12 displays this information.

The first column in the table gives the number of cues collected; the second the frequency count (i.e., number

TABLE 12.--Number of cues collected on Cases 7

and 8 and 10 teachers

HISTOGRAM/FREQUENCIES	CASES=CASE 1-10
MIDPOINT	FOR 1.CUE7 (EACH X= 1)
0.	+ X= Case 7 mean= 42.3
10.000	+0 N=10
20.000	+X
30.000	+XO 0= case 8 mean= 51.4
40.000	+XXXXXO N=10
50.000	+XXOO
60.000	+OO
70.000	+OO
80.000	+O
90.000	+X
100.00	+
TOTAL	10 (INTERVAL WIDTH= 10.000)

of teachers) for each of these cue values. For example, one

teacher collected about 30 cues for Case 7, and one collected

30 for Case 8.

As the table shows, different teachers collected

different numbers of cues, from a minimum of about 10 to a

maximum of about 90. In other words, the teachers tended to

collect different amounts of information to reach diagnostic

judgments.

These differences might have stemmed from the

different models the teachers used (if they used any).

A teacher operating from a comprehensive model was likely

to gather more information about the case than one operating

from a non-comprehensive model. Indeed, teacher No. 7,

who seemed to operate from a socio-psychological (non-comprehensive) model, collected the fewest cues of all teachers (17 for Case 7; 12 for Case 8), and made the least number of diagnostic judgments (3 for Case 7, 2 for Case 8). Her diagnostic judgments for Case 8 dealt only with emotional problems that might have affected the child's reading performance (It is interesting to note that, during the observational session, this teacher wanted to stop gathering information about the case after having collected only 10 cues. She explained: "I think I know what the problem is; I already made up my mind").

Number of diagnostic judgments

Table 13 shows the number of diagnostic judgments the teachers made for Cases 7 and 8. The first column represents the number of diagnostic judgments made; the second column shows the frequency count for each of these values. For example, two teachers made four judgments for Case 7, and one made four diagnostic judgments for Case 8.

As Table 13 indicates, the teachers differed in the number of diagnostic judgments they made for a given case. The number of judgments ranged from 2 (made by one teacher for Case 8) to 14 (made by two teachers for Case 8). As in the case of cues collected, these differences might have been caused by the different models of reading and diagnosis from which the teachers operated.

TABLE 13.--Number of diagnostic judgments for Cases 7 and

8 made by 10 teachers

HISTOGRAM/FREQUENCES	CASES = 1-10		
MIDPOINT	FOR 1.DIAGNOSE (EACH X= 1)		
0.	+	X= Case 7	mean= 7.2
2.0000	+0	N=10	
4.0000	+XX0		
6.0000	+XX	0= Case 8	mean= 9.0
8.0000	+XXX0	N=10	
10.000	+XX000		
12.000	+X00		
14.000	+00		
16.000	+		
18.000	+		
20.000	+		
TOTAL	10 (INTERVAL WIDTH= 8.0000)		

As with length of interaction and number of cues collected, Table 13 also suggests that similar individual differences existed in teachers in terms of the number of diagnostic judgments they made for a case.

Summary

The data presented in Table 11 through 13 suggest that the teachers differed significantly from one another in the length of time they interacted with the simulated cases, the number of cues they collected, and the number of diagnostic judgments they made.

Since differences among the teachers were observed for each of these variables, it might be worth asking what relationships existed among these variables. Table 14 summarizes the mean correlations among length of interaction, number of cues collected, and number of diagnostic judgments for Cases 7 and 8.

TABLE 14.--Correlations among length of interaction, number of cues collected and number of diagnostic judgments for Cases 7 and 8 and 10 teachers

		TIME	CUES	DIAGNOSES	TIME	CUES	DIAGNOSES
(7)	TIME	1.0000					
	CUES	.4942	1.0000				
	DIAGNOSES	.4650	.6109	1.0000			
(8)	TIME	.4970	.5120	.4574	1.0000		
	CUES	.5172	.4679	.1450	.3278	1.0000	
	DIAGNOSES	.5381	.5390	.9672	.4614	.2421	1.0000
		TIME	CUES	DIAGNOSES	TIME	CUES	DIAGNOSES
		CASE 7			CASE 8		

Because of the small number of teachers involved, no generalizations can be drawn from these data. Descriptive statistics, however, suggest that, in this study, the following observed relationships existed:

1. Between length of interaction with a case and number of cues collected (.49 for Case 7, .32 for Case 8). On

the average, the more time teachers interacted with a case, the more cues they collected.

2. Between length of interaction and number of diagnostic judgments made (.46 for Case 7 and Case 8, respectively). On the average, the longer teachers interacted with a case, the more diagnostic judgments they made.

3. Between number of cues collected and number of diagnostic judgments made (.61 for Case 7, .24 for Case 8). In general, the more cues teachers collected for a given case, the more diagnostic judgments they made. (The marked differences in mean values between Cases 7 and 8 are probably due to differences in the number and kinds of cues provided. Case 8 included more items of information and more varied types of information than Case 7. Thus, to attempt a diagnosis on Case 8, the teachers had to collect more cues than they did for Case 7.)

4. Between length of interaction with Case 7 and length of interaction with Case 8 (.49). Most teachers interacted with the two cases for about the same length of time.

5. Between total number of cues collected for Case 7 and total collected for Case 8 (.46). Teachers who collected many cues for one case tended to collect many for the other as well; conversely, teachers who collected few cues for one case also tended to collect few for the other.

These differences among teachers in the number of

cues they collected might be explained by the Agreement Corollary. It may well be that different memories or models from which the teachers operated prompted them to collect different amounts of information. A skill-oriented teacher, for example, might have felt it necessary to collect a large amount of data to check the specific skills the child lacked. A teacher operating from a socio- psychological model, on the other hand, might have based his/her diagnosis on few cues, gathered in the narrow area of psychological and social background.

Differences in the teachers' personal characteristics (such as self-confidence, independence/dependence, etc.) might also have accounted for the differences in their diagnostic performances. Some people will always collect a large amount of information on which to base a decision, while others will use relatively little data.

6. Between number of diagnostic judgments made for one case and number of diagnostic judgments made for another (.96). Teachers tended to make approximately the same number of judgments for each case, relative to each other.

The explanation for this observation might also lie in the Agreement Corollary. The memories and models from which teachers operate affect the number of judgments they make. A teacher operating from a psycho-social model, for example, will tend to entertain a limited number of

diagnoses about a case. The same is true of a teacher who operates from a skill-model orientation. Consistent use of one distinct model probably leads the teachers to make similar diagnoses for different cases of reading difficulties. It is logical that, if the teachers make similar cross-case diagnoses, they entertain about the same number of diagnostic judgments.

The data presented in this section suggest that, although teachers differed from one another in their diagnostic performances on the three variables, they were fairly consistent in their own interactions with the two cases of reading difficulty.

Analysis of the relationships between cues collected and teachers' verbatim comments about these cues

While interacting with the simulated cases, the teachers were asked to verbalize their thoughts about the information they collected. They were asked to do this again during the debriefing session. Their verbatim statements were audiotaped and transcribed by a clinical observer. Data analysis explored the relationships between cues collected and the teachers' comments about the cues.

The examination of these relationships was guided by a basic question: What diagnostic strategies did the 10 teachers employ? This question was approached in two ways: (1) through analysis of quantitative features of teachers' diagnostic processes, and (2) through analysis

of the types of verbatim comments the teachers made about the cues.

The data selected for analysis were those collected during the teachers' initial diagnostic interactions (five with Case 7 and five with Case 8). The researcher felt that the experience of interacting with the first simulated case might have altered the manner in which teachers dealt with the second case (session 1 served as a training session for session 2), and he preferred to focus on the teachers' initial processes of gathering and evaluating information about the reading difficulties.

Table 15 lists three of the quantitative features of the teachers' diagnostic processes -- (1) number of verbatim comments made, (2) average cue percent time (i.e., proportion of time elapsed when half of cues were collected), and (3) average verbatim percent time (i.e., proportion of time elapsed when half of verbatim comments were made).

As Table 15 suggests, marked individual differences existed among the teachers in relation to number of verbatim comments they made about the cues they gathered and the case. They could have made from zero to 1 or more comments about each of the cues.

The table also indicates that, for both cases, teachers tended to collect cues throughout the interaction. They also tended to talk and express their thoughts about the case in relation to the cues collected throughout the interaction. As the table shows, on the average, about

TABLE 15.--Number of verbatim comments, mean cue percent
time and verbatim percent time for Cases
7 and 8 and 5 teachers

	STATISTIC	TEACHERS									
		1	2	3	4	5	6	7	8	9	10	X
(7)	Number of verbatim comments	59		82		60		78			85	72.8
	Average cue percent time	.535	.637	.513	.635			.625	.589
	Average verbatim percent time	.470	.565	.402	.521			.484	.488
(8)	Number of verbatim comments	50		41		64		34		69		50.6
	Average cue percent time	.513	.655	.465	.630	.493			.511
	Average verbatim percent time	.518	.578	.471	.565	.509			.528

half of the cues were collected after 60 percent (.589) of
the session with Case 7, and after 55 percent (.551) of the
session with Case 8. This means that a somewhat larger
number of cues was collected during the second half of the
observational sessions than during the first half. This may
suggest that, as the teachers felt time was running short,
they accelerated the rate at which they gathered information
about the case.

The teachers' cognitive or diagnostic processes were also explored through analysis of the types of verbatim comments they made about the cues they gathered during the interactions and the debriefing sessions that followed. This anlaysis provided data about some of the charac- teristics of the teachers' clinical problem-solving behavior, including: (1) how much they observed specific reading behaviors, and (2) whether they posed and tested hypotheses about the cases' problems. Figure 3 shows the percentage of verbatim comments and their relationships to cues.

This figure shows the distribution of teachers' verbatim comments among 10 different types of possible relationships between cues and statements. The verticle line represents the percentage of verbatim comments made by all 10 teachers for Cases 7 and 8. The horizontal line denotes the types of relationships which existed between cues and statements. (See pages 86-87 for description of each of these relations.

The data indicates that:

1. The teachers did not formulate hypotheses about the reading difficulties of a given case. That is, their data-gathering was not oriented toward confirmation or disconfirmation of hypotheses about the case's problems. Only seven percent of the teachers' total verbatim comments dealt with hypotheses.

2. The teachers tended to observe rather than assess or evaluate students' reading difficuties. Twenty-four
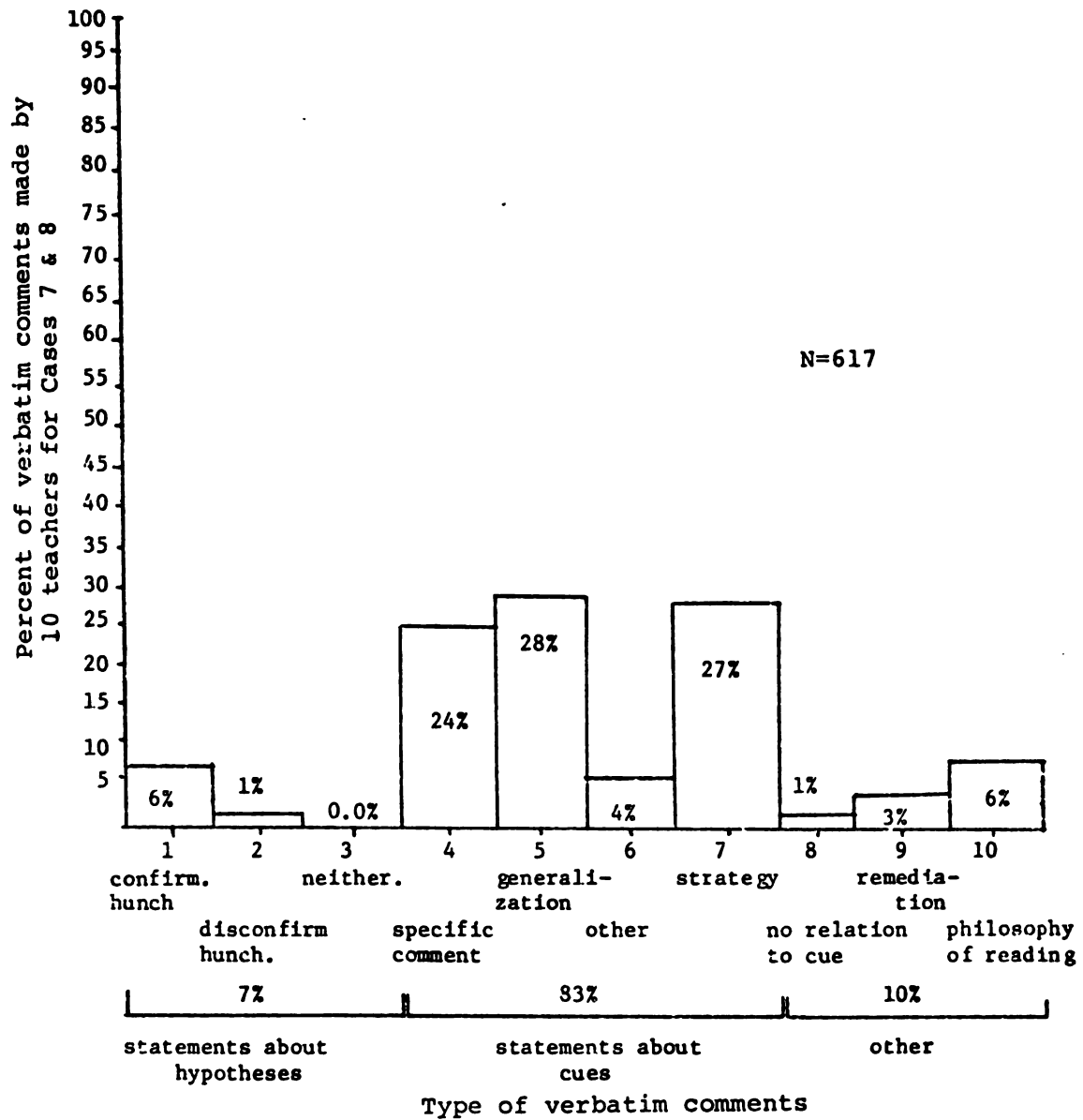
Figure 3.--Cue to statements relationships

percent of the statements related specifically to the cue collected (relation type 4). Although the teachers did relate several observations to one another (relation type 5 - twenty-eight percent), they did not go beyond the mere observation level (to a diagnostic level).

3. The teachers tended to talk about what they did as they interacted with a case (twenty-seven percent of their statements self-described the way in which they gathered information). They did not, however, describe how they reached diagnostic judgments.

Process measures: Summary

The process measures presented in this section revealed the following:

1. The teachers differed significantly in terms of how long they interacted with the simulated cases, the number of cues they collected, and the number of diagnostic judgments they made.

2. There were observed relationships among length of interaction, number of cues collected, and number of diagnostic judgments. The relationships held for interactions with both cases.

3. The teachers were inferential problem solvers, to the degree that they problem solved at all. They did not pose and test hypotheses about the cases, and did not gather information to confirm or disconfirm hunches.

Rather, they gathered data and commented about it. They were observers of children's behaviors, but they did not process the observed information in a manner that led to accurate and complete diagnostic judgments.

Part 3: Classroom interviews

The main purpose of the classroom interviews was to explore teachers' diagnostic skills in the natural classroom environment and to investigate the relationships between these diagnostic skills and those exhibited in the laboratory situations.

The interviews were intended to help provide answers to two questions: (1) Is the examination of teachers' interactions with simulated cases in Laboratory situations a valid means of studying teachers' diagnostic skills? and (2) What are some of the diagnostic processes employed by teachers in the natural classroom environment?

This part of the investigation was approached in two ways: (1) through analysis of the diagnostic categories most frequently mentioned by teachers in the classroom, and (2) through analysis of the similarities and differences between diagnostic categories mentioned in the Laboratory and the classroom situations.

Following a discussion of the results of these analyses, several other findings, based on a few other interview questions, are discussed.

What are the diagnostic categories most frequently mentioned by teachers in the classroom?

During the classroom interviews, the teachers discussed various elements of reading to which they attend when reaching diagnostic decisions about students' reading performances. A domain of these diagnostic categories was created, and redundancies were eliminated. The final list contained six specific categories, grouped into 6 general classes: Comprehension, Vocabulary, Word recognition, Word attack, Oral reading and Student's characteristics (See Appendix H: Diagnostic domain based on classroom interviews).

A question of interest was, what proportion of teachers mentioned each category. This information is important because it might give some idea of which diagnostic categories teachers most frequently deal with, or think of. Table 16 shows the diagnostic categories most frequently mentioned in the classroom interviews.

The first column in the table lists the diagnostic categories mentioned by at least 30 percent of the teachers. The second column shows the exact percentage of teachers who mentioned each category. For example, "Sight Vocabulary" was mentioned by 100 percent of the teachers (n=10), whereas "Blends" was mentioned by only 30 percent (n=3).

A close look at these data about the diagnostic categories reveals that:

TABLE 16.--Twenty-eight most frequently mentioned diagnostic

categories in the classroom (Total of 96)

DIAGNOSTIC CATEGORIES	PROPORTION OF TEACHERS MEN- TIONING THE CATEGORIES
Sight vocabulary	1.00
Comprehension	.90
Silent reading comprehension	.80
Oral reading	.80
Oral reading comprehension	.70
Word recognition	.70
Vocabulary	.60
Endings	.60
Context	.60
Listening comprehension	.50
Word analysis	.50
Decoding	.50
Phonetic analysis	.50
Beginning sounds	.50
Short vowels	.50
Word attack	.40
Chunking	.40
Sounds	.40
Word family approach	.40
Able to sound out	.40
Phonetic skills	.40
Print translation	.40
Substitutions	.40
Factual and inferential comprehension	.30
Vocabulary meaning	.30
Guesses	.30
Ending Sounds	.30
Blends	.30

1. Five of the six general categories composing the total diagnostic domain (Comprehension, Vocabulary, Word recognition, Word attack, and Oral reading) were mentioned by at least three teachers; however, different teachers discussed different sub-skills under each of these categories.

2. Those categories mentioned by at least 70 percent of the teachers were very general: Sight vocabulary, Comprehension, Silent reading comprehension, Oral reading, Oral reading comprehension and Word recognition. This suggests that the teachers rely on the same general diagnostic categories in reaching decisions. The experimental design might have been partially responsible for this finding. All ten teachers were given the same descriptions of reading difficulties, and these descriptions may have cued them to mention similar general diagnostic categories. The teachers seemed to differ, however, from one another, on the sub-skills within each of the general categories (e.g., miscues, skip words, punctuation, etc.).

Figure 4 shows the percentage of total diagnostic categories (n=96) mentioned by the teacehrs in the classroom interviews.

The verticle line gives the percentage of diagnostic categories mentioned, and the horizontal line shows the number of teachers who mentioned the categories. For example,
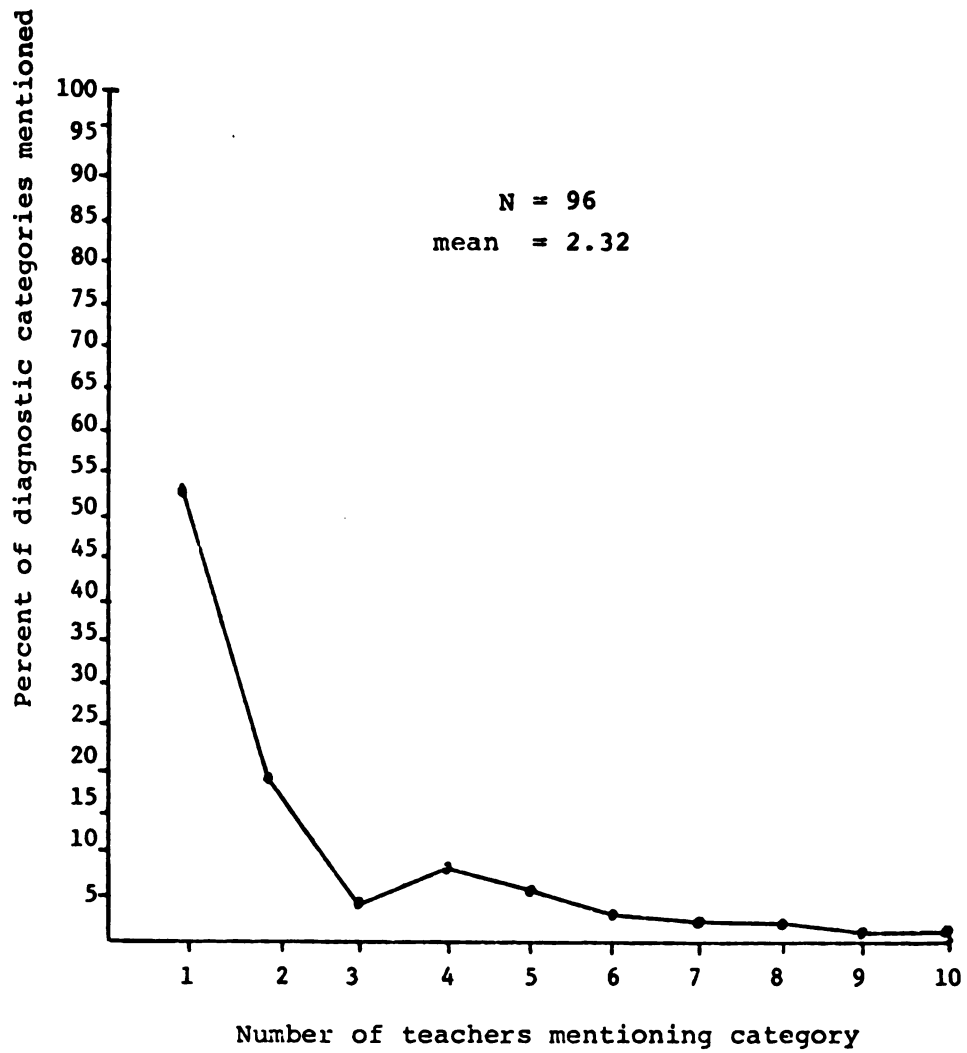
Figure 4.--Percent of the diagnostic categories mentioned
by teachers in the classroom

52 percent of the categories were mentioned by only one teacher, and 1 percent were mentioned by nine and ten teachers, respectively.

It should be noted, however, that teachers' agreement on diagnostic categories mentioned in the classroom interviews is slightly higher than their diagnostic agreement for Cases 7 and 8 (Figure 1). This is so because, during the interviews, the teachers tended to make general statements, whereas during the laboratory interactions with the cases they were more case-specific.

It must be pointed out that the classroom interviews were based on four descriptions of deficient readers which were given to the teachers. The teachers were asked to match two of these descriptions with students in their own classrooms. As one might expect, the teachers found differences among the described readers, and made different diagnostic judgments about them. The number of teachers who matched readers in their own classrooms with the descriptions varied from seven (70 percent), for the description of "Michelle", to three, for the description of "Diane" (Appendix E lists the number of teachers who noted similarities between children in the descriptions and children in their own classrooms).

Similarities and differences between teachers' diagnostic categories in laboratory and classroom situations

After the domain of diagnostic categories (judgments) mentioned by the teachers in the classroom was compiled, it was compared with the domain of judgments made by the teachers in the laboratory setting. This was done for two reasons:

1. It was hoped the comparison might point to the existence or absence of a model of reading held by the teachers, or at least, to a consistency or inconsistency in their thinking about reading problems. If similar diagnostic categories are mentioned by teachers in both laboratory and classroom situations, it may suggest that they operate from a model, or from a certain"memory" which contains these cateogires.

2. Checking for similarities and differences between diagnostic categories mentioned in the laboratory situations and those mentioned in the classroom was one way of exploring whether carefully-desi observational studies in laboratory settings are reliable and valid means of investigating the clinical problem-solving behavior of teachers. Similarities among the categories, it was thought, would suggest that teachers perform in both situations in a similar manner, or at least from the same model or with the same memory.

A careful look at the data reveals that, on the average, 50 percent of the diagnostic categories mentioned by the teachers in laboratory settings were also mentioned during classroom interviews (See Appendix F).

Table 17 shows the numbers of diagnostic categories mentioned by each teacher in laboratory setting (for the two simulated cases) and during classroom interviews.

TABLE 17.--Number of diagnostic categories mentioned by teachers in laboratory and classroom situations

CONDITION	TEACHERS										
	1	2	3	4	5	6	7	8	9	10	X
Laboratory: Cases 7 & 8	13	15	24	21	24	6	5	19	17	18	16.2
Classroom	30	18	22	24	19	26	22	26	17	26	23.0
Number of categories mentioned in both laboratory and class-room	8	9	13	13	6	5	3	8	7	11	8.5

As the table indicates, the number of diagnostic categories mentioned by the teachers in the classroom outnumbered the number of diagnoses made in the laboratory. This may suggest that the domain of diagnostic categories simulated by the two simulated cases was more limited than

that which evolved from the natural classroom setting.
Looking carefully at the kinds of diagnostic statements
mentioned in both the laboratory and the classroom
(Appendix F), we can see that the statements tended to
fall into two categories:

1. general statements, such as: "Vocabulary concepts:
    knows major concepts"; "Sight vocabulary: good". In
    other words, these are general statements about the
    reading act which do not require careful and detailed
    diagnosis of a child's reading difficulties;

2. statements which seem to be characteristic of individual
    teachers rather than individual students, such as:
    "Insecure about herself"; "the manifestations of her
    problems are dialectical based". In other words, some
    statements about the reading act seem to emerge
    primarily from the teacher's philosophical orientation
    (or model) about the causes of reading difficulty,
    rather than from some specific aspect of the child's
    reading performance. (An extreme example was the
    set of statements made by teacher no. 7, who, in both
    laboratory and classroom situations, emphasized, above
    all, that children's emotional problems and self-concept
    are the main causes of reading deficiency. At the
    opposite extreme was teacher no. 3, who, in both
    settings, conducted thorough and detailed diagnoses and
    considered many variables as potential causes of the
    reading difficulty).

Diagnostic judgments mentioned in either laboratory or classroom situation (but not in both)

Diagnostic categories mentioned in the laboratory but not during classroom interviews (see Appendix F) tended to be very case specific. They applied directly to the simulated case the teacher was attempting to diagnose, and frequently consisted of some sub-skills of the reading act applicable to this case (e.g., "punctuation: does not pay attention to"; "syllabication skills: poor"; "plural endings: poor," etc.). During classroom interviews, when the teachers discussed either the individual students in their classroom or their diagnostic practices in general, specific sub-skills, which were case specific, were not mentioned.

Diagnostic statements mentioned in the classroom but not in the laboratory settings (See Appendix H) tended to fall into two categories:

1. Case specific statements, i.e., statements related directly to the individual student whom the teacher was describing during the interview. Especially prevalent were statements which related to the child's factors.

2. General statements, usually mentioned by the teacher as she described her instructional and diagnostic practices in reading (e.g., syllables, compound words, decoding). These were not mentioned in the laboratory setting because the interactions with simulated cases forced the teachers to be as specific as possible in their diagnoses.

The data presented in Table 18 show the diagnostic categories most frequently mentioned in the laboratory and classroom situations.

TABLE 18.--Most frequently mentioned diagnostic categories in laboratory and classroom settings

DIAGNOSTIC CATEGORIES	LABORATORY		CLASSROOM
	Case 7 specific	Case 8 specific	Children in general
Sight vocabulary	5	7 (12)	10
Comprehension	2	4 (6)	9
Oral reading	4	3 (7)	8
Silent reading comprehension	0	0 (0)	8
Oral reading comprehension	1	2 (3)	7
Word recognition	5	1 (6)	7
Endings	5	0 (5)	6
Context	2	1 (3)	6
Vocabulary	3	3 (6)	6
Beginning sounds	1	2 (3)	5
Short vowels	0	1 (1)	5
Listening comprehension	0	2 (2)	5
Decoding	0	0 (0)	5
Print translation	0	3 (3)	4
Phonetic skills	2	3 (5)	4
Word attack	2	3 (5)	4
Chunking	2	1 (3)	4
Word family approach	0	0 (0)	4
Factual & inferential comp.	1	2 (3)	3
Vocabulary meaning	2	3 (5)	3
Guesses	2	2 (4)	3
Ending sounds	0	1 (1)	3
Blends	0	2 (2)	3

These data indicate that, in general, the diagnostic categories mentioned most often in the laboratory were also mentioned (and usually more frequently) during the classroom

interviews. This may suggest that teachers think of these general reading categories in both laboratory situations and the natural classroom environment.

The few differences which were noted between the categories the teachers entertained in the laboratory setting and in the classroom (i.e., Silent reading comprehension, Decoding, and Word family approach) might have stemmed from the fact that the Laboratory interactions were case-specific, and thus discouraged the teachers from considering the diagnostic categories they would consider in the classroom.

In summary, looking at similarities and differences between diagnostic statements mentioned in the laboratory setting and those mentioned in the classroom, we noted that the diagnostic categories most frequently mentioned in the laboratory were also mentioned in the classroom. Those which were mentioned in only one setting tended to be either (1) case specific to the simulated case, or to the individual student described by the teacher in the classroom, or (2) general comments, usually about the instructional and diagnostic practices the teachers mentioned during classroom interviews.

Overall, (when one excludes these two types of diagnostic categories), the data indicate that teachers appear to rely on similar diagnostic categories in both laboratory and classroom settings. This suggests that whatever the diagnostic "memory" teachers have, it is dominant in their interactions with cases of reading difficulties, whether these interactions take place in a

laboratory setting or in the classroom.

Other findings

As stated (p. 129), the interviews with the teachers included several additional questions related to reading diagnosis and remediation; the teachers' responses to these questions are discussed below.

An important question about the processes of reading diagnosis and remediation is whether teachers offer differentiated remediation plans for different reading problems or different children. The question is important because it deepends the investigation into teachers' memories and their functional models of reading diagnosis. One can expect that, the more complete the memories teachers have, and the more complete and sophisticated their models of reading are, the more differentiated the remediations they offer will be. These different remediations will depend on the specifics of the reading characteristics exhibited by the different students the teachers deal with. If the teachers' memories are not intact, and if they either lack a model of reading or have an incomplete one, they will probably offer similar (or standardized) remediation plans for all cases of reading difficulty they encounter.

Following is a list of remedial plans mentioned by each of the 10 teachers during the classroom interviews. It is composed of only those remediations which were mentioned

for both of the cases whose reading difficulties the
teachers addressed:

Teacher 1: Work on phonetic skills.

Teacher 2: a) Take words out of context and see how the child
can handle it.

b) Encourage the child to work.

Teacher 3: a) Work on beginning, middle and ending sounds.

b) Have the child work with an aid on short-
paragraph stories.

c) Have the child go to a reading specialist for
half an hour each day.

d) We'll work on short paragraphs with many
questions.

Teacher 4: a) Work on print translation.

b) Focus on context until the child realizes
that things make sense.

Teacher 5: A lot of practice.

Teacher 6: a) Work on vocabulary.

b) Spend time with him on an individual basis.

Teacher 7: a) Try to get the child to read words he/she
cannot sound out.

b) Send words home, ask mother or father to help
the child.

c) Ask the child to look at the picture.

d) He/she needs to pay more attention.

e) Have games with words.

Teacher 8: a) Give the child additional material to read.

b) Have him/her read on a one-to-one basis.

c) Have him/her work on worksheets.

Teacher 9: a) Send the child to a reading teacher.

b) Do more individualized work with the child on a one-to-one basis.

Teacher 10:a) Encourage the child to do more by himself.

b) Encourage the child to ask for help.

c) Send the child to a reading lab.

An examination of this list of remediations reveals the following:

1. Most of the recommended remediations are very general, such as: "Work on print translation"; "work on phonetic skills", etc.

2. Many of these remediations call for additional practice rather than dealing with the specifics of the problems, e.g.: "He needs a lot of practice"; "give him additional material to read"; "encourage him to work", etc.

3. Much of the practice prescribed is carried out on an individual basis with the teacher. Here agin, the remediation is expressed in very general terms: "He will work with an aid on short paragraph stories"; "spend time with him on an individual basis" (6); "do more individualized work with the child" (9); "have him read on a one-to-one basis" (8).

The data obtained from the list of all remedial strategies mentioned by the teachers (whether applicable to the two cases they described or to only one of them) not only support the notion of a "general remediation" phenomenon, but reveals three additional points:

1. At least seven (70 percent) of the ten teachers stressed psychological characteristics of the child: "I didn't hassle her" (3); "encourage her to be brave" (4); "make him feel comfortable about himself" (6), etc. Thus, it appears that these teachers tend to emphasize personal factors which might affect the reading act, rather than offering specific remedial strategies to overcome the problems.

2. At least five (50 percent) of the teachers said that they send students like those described to reading specialists for remediation (or that they at least confer with specialists). Again, the teachers do this in lieu of offering some specific remedial techniques.

3. At least four (40 percent) of the teachers, when asked about remediation for a specific area of reading difficulty, such as word recognition or word analysis, said that they do not know what to do ["I don't know where I'm going from here" (1); "I would have known at least what not to do" (2); "the problem was never really remediated" (3); "I don't know" (5)].

Summary: The remediation plans offered by the teachers for the cases of reading difficulty reveal three general trends:

1. The teachers seem to offer remediation at a very global level. Emphasis is placed, specifically, on practice, drill, and individualized help from others.

2. The teachers often refer students to reading specialists.

3. They try to help the students overcome some perceived personal problems.

If these are the major remediation plans offered by teachers for cases of reading difficulty, it must be asked how successful are they in remeidating children with reading problems in their classrooms? Following are the teachers' responses, in their own words, to the question: How do you know when and if you have remediated a child's reading problem? (Question No. 12 in the interview)

Teacher 1: "I feel that if a child is able to read orally a page, or silently, and be able to recognize or to sound out words and at least answer little questions...the child is on his way to really learning to read."

Teacher 2: "I never felt that I've (remediated). I don't know. I never reached the point where I felt a child has been remediated. I can see improvement perhaps, or growth, but I don't know of anyone that's ever reached that point."

Teacher 3: "When I see a change of attitude, that they are liking reading, beginning to participate in class work, raising their hand, answering questions better, when things like initial sounds (that were difficult for them at the beginning) become easy, and the testing in general."

Teacher 4: "I start to hear it: a) when a kid starts to make sense; b) when (a child) starts to make pretty close graphic or graphophonemics correspondences; c) when the kid starts to pull all things together."

Teacher 5: "a) If they can do exercise or practice after a lesson; b) I guess with a number of kids I'm aware of some specific problems that they had and so I try to notice if they still have them."

Teacher 6: "For some you can never remediate, that's just their ability. For the average child that has difficulty just a lot of repetition and drill."

Teacher 7: "I have work sheets that I give out in the afternoon and usually they correspond with something the child has read about. If they can do the worksheets then I assume the problem has been remediated."

Teacher 8: "a) When it comes time to change books or through a test that I may give at the end of the book and see how well they do; b) I try to see if a child can orally read a page without any or few mistakes. I (also) check back in his workbook and see if he made a lot of mistakes."

Teacher 9: "I don't know if I've ever run into that. I guess any kid that I've had that's really been a low reader has still been a low reader at the end of the year."

Teacher 10: "In terms of specific skills: the reading lab has individual tests for different objectives at different grade levels. So after the child has special instruction in a reading skill they get this test and if they get them all right then they figure the child knows the skill. If he misses -- they go back and reinstruct and have more work sheets."

Several characteristics of these responses stand out:

1. They range from general statements (e.g., "when the kid starts to pull all things together" (4) to more specific ones (e.g., "if they are able to recognize or sound out words" (1).

2. They range from statements about non-measured attitudes (e.g., "if I see a change of attitude, that they are liking reading" (3) to statements about observed and measured performance (e.g., "if they can do the worksheets" (7).

3. They range from statements which express teacher's confidence in remediations (e.g., "I start to hear it" (4), to those which suggest a lack of confidence in remediation ("I never felt that I've remediated" (2). Three of the ten teachers expressed a similar lack of confidence in their ability to remediate reading problems.

Teachers' responses to specific interview questions:
Question No. 8: What overall methods do teachers use in the classroom to find out children's reading performance?

Teachers' responses to this question indicated that, in general, there are two general approaches to assessing a child's reading performance: (1) to consider his or her grouping from the previous year, with some additional testing (3,9,10); and (2) to listen to the child read a passage (1,4,5,6,7,8,10) and to pay special attention to comprehension and vocabulary. Almost never are specific tests or detailed diagnostic techniques mentioned.

Question No. 9: How do teachers teach reading in their classrooms?

Vocabulary and comprehension, which were emphasized in answers to the previous question, were also emphasized in

the teachers' responses to this question. These two
aspects of reading are apparently central to the reading
programs of all 10 teachers.

Specific strategies for teaching reading were rarely
mentioned; most teachers discussed what and how they teach
only in global terms (exceptions were teachers 6 and 9 who
outlined, more systematically, the different activities
they use in a typical reading lesson). This lack of
specificity might be attributed to two factors: (1) failure
of the interview to probe the more specific steps involved in
reading instruction, and (2) absence of a model which enables
teachers to more thoroughly formulate for themselves (and,
thus, to describe to others) the act of reading and its
various components.

Question No. 11: Do teachers individualize
reading instruction?

Most of the teachers said they do not individualize
instruction. Teacher No. 3 said she would individualize
only for readers in the lowest group, but not for those
in the top and middle groups. Teacher No. 8 emphasized
that, although she does not individualize instruction, she
does individualize the workbooks. Teacher No. 10 was the
only one to say that she individualizes reading instruction
"almost completely".

These responses seem to contradict some of the
findings discussed earlier, based on data obtained during the

initial part of the interview, when the teachers were asked to talk about their remedial practices. As stated (p. 143), at least three of the teachers (6,8,9) said they work with students on an individual basis. There is a two-part explanation of the teachers' apparent inconsistency:

1. Usually, the teachers did not think of themselves as individualizing reading instruction. However, during the interviews, when they were encouraged to focus on an individual child, they noticed that they sometimes do, in fact, work with him/her on an individual basis.

2. Although the teachers do not individualize reading instruction, they do individualize remedial reading. In other words, there is a distinction between instruction and remediation. Instruction is usually provided to the class as a whole (or to groups). However, those in need of remediation work with the teacher on an individual basis.

Question No. 13: How do teachers know when to refer a child to a reading specialist?

Teachers' responses to this question can be divided into two:

Three teachers indicated that they do not refer the poor reader to a reading specialist. They said they feel they are qualified to help the student overcome his/her problems (4,6,11).

Of the seven teachers who said they do refer students to specialists, six explained that they make the move when they feel they have done everything they can with the students, but the reading problems persist. The seventh teacher in this group, no. 9, said she does not know much about reading remediation ("even though I teach reading every day"), so she refers children after only a week or so. (The six others indicated that they spend more time collecting informal data about the reader before deciding that she/he must be referred. Teacher no. 3 stood out in this regard. She said she waits until January to see whether a child has learned anything before sending him/her to the specialist.)

Question No. 14: What do teachers think the reading specialist should do?

Six of the ten teachers said that the specialist should work with teachers -- as a consultant -- on the diagnosis and remediation of reading problems. One teacher (no. 3) even claimed that, in many cases, this consultation should take the place of work between student and specialist. She explained that there are too many students with reading difficulties for the reading specialist possibility to accommodate.

At least four teachers said that the reading specialist should conduct diagnoses. Some explained that they, as teachers, do not have the expertise to do

sufficiently thorough diagnoses. One teacher (no. 4) called upon the reading specialist to do a "decent and accurate diagnoses", instead of "employing standardized testing procedures with all children". Furthermore, this teacher said the reading specialist should "address instruction to remediate the deficit", instead of recommending some standardized remediation (e.g., "everybody should do phonics").

Five teachers (5,7,8,9,10) said that the reading specialist should also work on remediation, particularly with students in great need of help. An important comment made by teacher no. 9 was that the specialist should also work with gifted children.

Overall, the teachers identified several duties and responsibilitieis of the reading specialist:

1. They agreed that the specialist is an important resource person in the school. (Some teachers said they wished there could be even more specialists in the school.)

2. They said the specialist should divide his/her time between students and teachers; the teachers explained that students are not the only ones who need help in reading related activities.

3. They suggested that, because there are more deficient readers than the specialist can accommodate, he/she should work with only those students who are in great need of help. This suggestion is consistent with two findings reported earlier:

152

a. That even when instruction is not indi-

vidualized in the classroom, remediation is (p. 149).

b. That most teachers refer students to a specialist only

when they feel they have done everything possible for

the students, but have not succeeded in remediating the

problems (p. 150).

Question No. 15: What do teachers feel are
their responsibilities as reading teachers?

Because teacher's responses to this question were

diverse and highly interesting, they are provided verbatim:

Teacher 1: "Getting the children who are below grade
level as near to grade level as possible. Those
who are at grade level -- to enrich what they
already have."

Teacher 2: "Provide the child with appreciation for reading.
Develop in children the sense that reading tasks
vary from pleasurable reading to reading for
specific purposes. Encourage students to be
involved with the reading act. Provide extra
assistance to students who are showing some prob-
lems."

Teacher 3: "Get children to like reading. Get them to
become used to the system ("there is a system in
reading, once they become comfortable with it,
they have learned to like to read")."

Teacher 4: "Work on inferential understanding. Build the
children's vocabulary. Get the children to
understand that they are reading for two reasons:
to get information and to enjoy it."

Teacher 5: "To be aware of specific problems. To individu-
alize instruction. To get through the books by
June."

Teacher 6: "To do the best in teaching kids how to read."

Teacher 7: "To teach dhilren to read at a fundamental
level.

Teacher 8: "That at the end of the year a majority of the
children can go into a third year with no
problem."

Teacher 9: "Give the children positive attitude toward
reading. Introducing them to different kinds of
reading materials. Help them feel successful in
whatever they are in their reading (even if they
are below grade level). Make sure they have the
skills taught by the materials or program we
use."

Teacher 10: "To determine where the kids are in terms of
reading skills and level when they come to me.
Make sure that they are moving from there at
a pace that seems appropriate for each of them."

Several characteristics of the teachers' answers

are apparant:

a) They range from very general statements (e.g. "to do

the best in teaching kids how to read" -- teacher (6)

to more specific ones (e.g., "build the children's

vocabulary" -- teacher (4).

b) They sometimes deal with students in general (e.g., "to

teach children to read at a fundamental level" -- teacher

(7) and sometimes with individual children (e.g., "to

individualize instruction" -- teacher 5).

c) They range from specific statements about reading

activities at the cognitive level (e.g., "work on

inferential understanding" (4) to more general statements

about the affective domain (e.g., "get children to like

reading" (3).

d) Several make no reference to the final product, or results (e.g., "encourage children to be involved with the reading act" (2), while others do take such things into consideration (e.g., "that at the end of the year a majority of children can go into a third year" (8).

It is interesting to note, in this context, that one teacher (no. 5), who had as one objective "to get through the books by June" later said that the interview made her aware that this objective is not so important. It is more important, she said, to help children overcome their reading difficulties. Accordingly, she added, "I begin to feel that diagnosis is much more important than what I have previously thought."

Question No. 16: Which of the following do you feel best characterizes your classroom situation with regard to reading instruction?

Four teachers (1,3,4,6) said that they have enough time to diagnose all the students in their classroom (A). Three (5,8,10) said they have enough time to diagnose individual children who have reading difficulties (B). Two teachers (2,9) said that, because of time pressure, it is impossible for them to conduct individual diagnoses (D). One teacher (7) was not sure of how to characterize her diagnostic patterns (E).

These findings suggest that teachers do tend to view reading diagnosis as a prime responsibility and that they do take the time to diagnose children with reading difficulties. It appears that only those who feel absolutely unqualified to conduct diagnoses refer students to reading specialists (e.g., teachers 2 and 9, who also mentioned earlier that they do not know how to diagnose) (pp. 145-146).

These findings raise two important questions: (1) How good is the diagnosis conducted by teachers who do not refer children to reading specialists? and (2) When teachers take the time to attempt diagnoses with slow readers, how much time is left for them to work on reading instruction with the other students in the classroom?

Summary

Results of this study were divided into three parts: findings derived from product measures, findings derived from process measures, and those derived from classroom interviews.

The most significant finding suggested by the product measures was that there is little agreement among teachers on their final stated diagnostic judgments for given cases of reading difficulties. This finding was supported by an analysis of the number and type of diagnostic judgments each teacher made, as well as by measures of the relationships between the diagnostic judgments of each of the teachers (diagnostic agreement score).

The major conclusion suggested by the process measures was that teachers apparently lack comprehensive or systematic approaches to gathering and evaluating information about cases of reading difficulties. This conclusion is supported by (1) differences among the teachers on length of interactions with the cases, number of cues collected and final number of diagnostic judgments made, and (2) the type of verbatim comments they made about the cues and the cases.

The major finding derived from the classroom interviews was that teachers consider similar global diagnostic categories in both laboratory situations and the natural classroom environemnt. It was also found that diagnostic and remedial categories mentioned by teachers in the classroom tend to be very general. This may indicate an absence of a comprehensive functional model of reading and diagnosis. It may also raise questions about the adequacy of the training teachers receive in diagnosis and remediation skills.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This study was an exploratory one designed to
investigate the clinical problem solving behavior of
classroom teachers as they diagnosed students' reading
difficulties in experimental and classroom situations.
The study was part of an extensive research program undertaken
by the Clinical Studies component of the Institute for
Research on Teaching at Michigan State University.

The literature on reading diagnosis indicates that
classroom diagnosis is viewed as an essential part of all
reading instruction. More specifically, it suggests the
following:

1. There is an agreement among educators that reading
    difficulties hinder students' intellectual and emotional
    development, and that early and continued classroom
    diagnosis is needed to prevent and remediate the
    reading problems.

2. There are varied meanings associated with the term
    "reading diagnosis." Most definitions suggest that there

are different levels of diagnosis: classroom, school, or
clinical. However, missing from all definitions are
descriptions of the cognitive processes teachers employ
as they gather information and attempt to reach
diagnostic decisions.

3. Although most researchers believe classroom teachers are
capable of diagnosing students with reading difficulties,
there is not enough empirical data to confirm or
disconfirm this belief.

In summary, a review of the literature failed to
provide a description of the diagnostic processes classroom
teachers use. Moreover, the review revealed a lack of
empirical evidence about the competence of classroom
teachers in diagnosing reading problems.

Procedures

Ten teachers were involved in the study, five from
the Chicago area and five from the Lansing area, all had
taken at least two courses in reading instruction at a
university level.

All 10 teachers went through the same procedures.
First, they interacted with two simulated cases of reading
difficulties in a laboratory situation. These simulated
cases, developed by Dr. Rebecca Barr of the University of
Chicago, represented the behaviors of students with reading
deficiencies. The cases were based on materials that would

be available to a classroom teacher and made use of the students' natural language patterns. In a second phase of the study, the teachers were observed in their own classrooms, and interviewed about their instructional, diagnostic, and remedial practices in reading.

Data Analysis

Data from laboratory interactions consisted of verbatim comments made by the teachers as they gathered and evaluated information about the two simulated cases, and of their final stated diagnostic judgments. These data were analyzed by means of product and process measures. Product measures consisted of (1) diagnostic agreement scores, (2) diagnostic ommonality scores, (3) cue agreement scores, and (4) cue commonality scores. Process measures included (1) length of interaction, (2) number of final diagnoses, (3) number of cues collected, and (4) relationships between cues and the teachers' verbatim comments.

Classroom interviews were analyzed in terms of (1) diagnostic categories mentioned in the classroom, (2) remedial techniques offered, and (3) teachers' responses to various questions in the interview. Comparisons were also made between teachers' classroom diagnoses and their laboratory diagnoses.

Results

The major finding suggested by the product measures was that the teachers differed from one another on their final stated diagnoses for the simulated cases of reading difficulties. The process measures yielded two major findings: (1) that the teachers apparently lacked comprehensive and systematic strategies for gathering and evaluating information about the cases in order to reach diagnostic judgments, and (2) that the teachers differed markedly from each other on length of interaction with a case, number of cues collected, number of final stated diagnoses, and number of comments made about case.

Analysis of classroom interviews revealed that the teachers mentioned similar global diagnostic categories in both the laboratory situations and the natural classroom environments. It was found that these categories tended to be very general.

Conclusions

Despite the small number of teachers participating, the study provides convincing evidence for the following conclusions:

1. Contrary to what the professional literature on reading diagnosis implies, classroom teachers do not seem qualified to diagnose and remediate cases of reading difficulties. The results of this study suggest

that teachers are ill-equipped to carry out these functions. This apparent deficiency may be the result of two interrelated causes: (1) insufficient training of teachers in reading diagnosis and remediation, and (2) absence of a comprehensive model of reading and diagnosis.

Several examples support this conclusion. As one teacher (no. 7) interacted with a simulated case, she said: "The problem is that (the child) can't have phonetic analysis of words". Later, when this teacher stated her final diagnoses, she focused entirely on emotional problems (she also cited emotional problems during classroom interviews). It seems that this teacher operates from a psychological model, which is only remotely related to the reading act, if at all.

Another teacher (no. 8), after looking at only a few items of information about a case, said: "From her word meaning knowledge I assumed very fast that comprehension was one of her better areas". In her subsequent work on this case, this teacher looked at no items of information about comprehension (whereas seven other teachers had something to say about the comprehension level of this case).

A third teacher (no. 9), interacting with simulated case (Case 7), made two final diagnoses that contradicted each other: (1) "the child reads hesitantly", and (2) "the child reads very well".

162

These examples suggest that these teachers do not operate from comprehensive models of reading and diagnosis.

The notion that teachers are ill-dquipped to conduct diagnoses is also consistent with results from studies of reading specialists and learning disabilities personnel conducted by the Clinical Studies group. Tables 19 and 20 show the diagnostic categories most frequently mentioned by eight senior reading clinicians who interacted with simulated cases in a 1977 observational study (Vinsonhaler, 1979), and those categories most frequently mentioned by the teachers in the present study.

A comparison of Tables 19 and 20 demonstrates that, in general, results for the proportional agreement in the two studies are quite similar. In both instances, most of the diagnostic categories listed were mentioned for a given case by only about 30 percent of the clinicians. There were, however, more diagnostic categories cited by at least 50 percent of the clinicians in the 1977 study than in the present study, possibly because the clinicians had more similar training backgrounds than did the 10 teachers. This explanation is consistent with the Agreement Corollary described earlier (pp. 57-62).

The consistency of results between the two studies is further illustrated by a comparison of the diagnostic agreement and commonality scores for each. Table 21 summarizes these comparisons:

TABLE 19.--Most frequently mentioned diagnostic categories

for 1977 observational study

(8 clinicians, 4 cases)*

Diagnostic categories	Case A	Case B	Case C	Case D
At least average reading potential	.67	.33	.50	.67
Adequate verbal skills	.33	.50	.50	
Poor oral reading	.50	.67	.33	
Problems with vowels	.50	.33	.33	
Sight words: Low	.33		.83	
Phonics: Weak	.33			.67
Auditory acuity: Problem		.50		.67
Consonant blends: Not a problem	.33		.33	
Good use of context	.33		.33	
Writing: Problem	.33	.33		
Spelling: Problem		.33		.33
Normal interest and behavior			.33	.33
Attitude toward reading: poor	.50			
No problem isolated letter sound skills	.50			
Speech: Problem		.50		
Problem with Syllables		.50		
Handwriting: Problem		.50		
Problem with visual memory			.50	
Health problems in school				.50
Poor word analysis skills				.50
Auditory discrimination: problem				.50

*--denotes 0.00

TABLE 20.--Most frequently mentioned diagnostic categories

for Cases 7 and 8 and 10 teachers*

SELECTED DIAGNOSTIC CATEGORIES	Case 7 (54 total DX)	Case 8 (62 total DX)
Endings: Ignores	.50	--
Sight words: Weak	--	.50
Sight vocabulary: Good	.40	--
Vocabulary concepts: Adequate	.30	.30
Comprehension: Poor	.30	--
Oral reading: Skips words	--	.30
Oral reading: Does not pay attention to punctuation	--	.30
Phonic skills: Weak	--	.30
Word attack skills: Lacks	--	.30
Print translation: Problem area	--	.30
Oral reading comprehension: Good	--	.20
Understanding: Good when listening	--	.20
Literal comprehension: Adequate	--	.20
Beginning sounds: Knows	--	.20
Initial consonants: Strong	--	.20
Syllabication skills: Poor	--	.20
Unfamiliar words: No attempt to sound	--	.20
Context to help with the unknown word: Does not use	--	.20
Language: No language problem	--	.20
Comprehension: Adequate	.20	--
Vocabulary: Weak	.20	--
Punctuation: Lacks	.20	--
Reversals: Problem area	.20	--
Mispronunciation errors: Did not correct	.20	--
Vowels: Need work	.20	--
Word analysis: Weak	.20	--

*--denotes 0.00

TABLE 21.--Diagnostic and commonality scores for the

classroom teachers study

and the 1977 study

STATISTICS	Classroom teachers study 10 Classroom teachers				1977 Study 8 Reading Clinicians	
	Case 7		Case 8		(24 data points)	
	score	SD	score	SD	score	SD
Diagnostic agreement	-.04	.13	-.03	.11	-.07	.17
Diagnostic commonality	.45	.29	.45	.23	.55	.18

As Table 21 shows, diagnostic agreement and
commonality scores were markedly similar for the classroom
teachers and the reading clinicians. This further
suggests that the findings of the present study are
generalizable.

2. Overall, teachers seem to lack the information processing
   strategies that are necessary for gathering and
   evaluating information about students' reading
   difficulties. Their diagnoses in both the laboratory
   situations and the natural classroom environment tend
   to be very global, non-specific and incomplete. They
   are confined to a set of general observations that do

not necessarily form a comprehensive picture of
the child's reading performance. The teachers are
observers of students' behaviors; at best, they
can say what the children cannot do, rather than
offer complete and specific diagnoses.

That this is so should come as no surprise, for
several reasons: For one thing, teacher education programs
rarely provide teachers with thorough preparation in
decision-making and diagnostic skills. Moreover, the
models of reading and learning teachers are given in training
programs may be inadequate and incomprehensive. Finally,
most programs emphasize method courses and the acquaintance
of prospective teachers with a variety of subject areas,
rather than more specialization.

3. Investigations conducted in laboratory settings,
   carefully planned and monitored, seem to be a valid
   and appropriate means of studying the clinical
   problem solving behavior of classroom teachers. The
   fact that the performance of the individual teachers
   in this study were consistent across two simulated
   cases suggests that the cases elicited at least some of
   the teachers' habitual problem-solving behavior. That
   the general diagnostic categories mentioned by teachers
   in the laboratory settings were also mentioned during
   classroom interviews suggests that the teachers
   operated from similar models of reading in both

situations. Furthermore, the teachers' own comments about the laboratory interactions support the claim that the laboratory conditions did, indeed, resemble the natural classroom situation with regard to the diagnosis of individual readers.

Recommendations

There is a clear need for the classroom teacher to be a reading diagnostician. However, training in the diagnosis of reading difficulties has been reserved mainly for graduate level courses; most undergraduate teacher education programs do not provide sufficient instruction in this area. The adequacy of this kind of teacher education curriculum may therefore be questioned. Teachers need to be trained more thoroughly in diagnostic and remedial skills in reading. Such training should be based on a model of reading and diagnosis, and focus on the diagnostic strategies involved in gathering and evaluating data about students with reading difficulties.

Training of teachers in diagnosis and remedial skills can be conducted in laboratory situations, using simulated cases of reading difficulties. Teachers should be given much practice interacting with simulated cases, where it is possible for them to receive immediate feedback on their performance.

It is also necessary that additional studies be carried out to investigate further the clinical problem-solving behavior of classroom teachers in reading diagnosis. Instruments should be developed to relate, more precisely, teachers' diagnostic performances in laboratory situations to their performances in the natural classroom environment.

Research should also be conducted to investigate the impact of laboratory training with simulated cases on teachers' performances in the natural classroom environment.

APPENDICES

APPENDIX A

CASE INVENTORY

CASE INVENTORY

WORD MEANING (VOCABULARY CONCEPTS)

ISOLATION - the student is asked to define a word presented to him in isolation.
STUDENT GENERATED SENTENCE - the student is asked to use a word in a sentence.
TEACHER GENERATED SENTENCE - the teacher uses a word in a sentence and then asks the student to define the word.

BACKGROUND

Cultural-home background
Gloria's performance in school
Reading program
School history
Test information
School counselor's comments
Oral reading transcription
Comments on Gloria reading the passage
Picture accompanying the reading passage
Description of the picture in the reading passage

WORD RECOGNITION (IDENTIFICATION)

ISOLATION - the teacher prints a word and asks the student to pronounce it.
STUDENT CHUNKING (student syllabicates) - the student is asked to divide a printed word into syllables and then to pronounce it.

TEACHER CHUNKING (teacher syllabicates) - the teacher divides a printed word into syllables and then asks the student to pronounce it.

SOUND SYMBOL ASSOCIATION (phonetic analysis) - the teacher prints a single letter or letter group and asks the student to pronounce it.

COMPREHENSION: List of questions within a specific paragraph or non-paragraph specific questions.

SILENT READING COMPREHENSION with WRITTEN QUESTIONS and ANSWERS - the student reads a passage silently and then is asked to answer written questions about it.

SILENT READING COMPREHENSION with ORAL QUESTIONS and ANSWERS - the student reads a passage silently and then is asked to answer oral questions about it.

ORAL READING COMPREHENSION - the student reads a reading passage out-loud and is asked to answer questions about it.

COMPREHENSION PROBE:

LISTENING COMPREHENSION - the student listens to the teacher reading a passage, then the teacher asks the student those questions which the student did not answer correctly in the oral reading comprehension task.

ORAL READING COMPREHENSION PROBE - the student reads aloud the passage for the second time, and then the teacher asks the student those questions which the student did not answer correctly in the oral reading comprehension task.

169

APPENDIX B

DIRECTIONS FOR OBSERVATIONAL SESSION

APPENDIX B

DIRECTIONS FOR OBSERVATIONAL SESSION

I. Introduction

This research is being carried out by the Institute
for Research on Teaching (IRT) at Michigan State University.
The IRT needs to observe a number of classroom teachers in
order to develop some ways to train teachers to diagnose
children's reading problems in the classroom. By diagnosis
we mean: to determine the most probable strengths and
weaknesses of the child's reading performance. You have been
chosen as one of those who will be observed during our study.
Because this work will take several hours, the IRT will pay
you as a consultant for the College of Education.

II. Orientation

Let me explain the observational session. First, I
should emphasize that all personal information regarding this
session will be kept confidential. Your name will not be
part of IRT permanent records. Instead, a number will be

used. We are required by law to protect your privacy by keeping confidential your name, social security number, etc. Second, I should emphasize that we are not evaluating you in any way. We are merely interested in understanding how you go about determining the reading problems of a given child. Finally, let's consider what we shall actually do. The observation will be divided into two parts. In part I, you will interact with materials to analyze a simulated case of a child having reading difficulty. The case includes audio recordings of the child reading a passage aloud, a written transcription of his oral reading, some background information about the child and different tasks the child performed (e.g., his answers to comprehension questions). In just a minute I will explain to you how we developed this case. We would like you to interact with this case in the same manner you would use in interacting with a real child in your classroom. Please think aloud and verbalize your analysis of this case as you diagnose it. Stop whenever this interferes with your work.

During part I, an audio tape record will be made as you examine the case. The equipment here is required to prepare the tape. The tape recording will remain completely confidential. In part II, we shall jointly review the case while you attempt to recall what you were thinking about as you attempted the diagnosis. An observer with a reading background will join us to provide you with a "sounding board" to help you clarify your thinking and get a record down on

paper. Do you have any questions? (pause a few seconds; answer questions by repeating instructions or postpone discussion). (Experimenter collects subject release and consultation forms).

III. Case Inventory and Practice Case

We will now begin the session. Information concerning a case has been prepared for you to look at. Your task is to request this information about a case and to use this information to determine the most likely diagnosis about the child's reading performance and to suggest a general program of remediation. The way we developed this simulated case is as follows: we surveyed the children in a classroom and we picked up a child having reading problems in the classroom. We asked the child to read a printed passage, and then we collected some basic information on the child that seems to be useful to a classroom teacher in order to figure out what's wrong with the child's reading. In just a minute I will give you a copy of the reading passage. (Experimenter shows to the teacher the reading passage). The different types of information available are: Background (experimenter points to Background in the Case Inventory); Comprehension (Experimenter points to Comprehension); Word Meaning (Experimenter points to Word Meaning); and Word Recognition (Experimenter points to Word Recognition). As a teacher you

probably deal with these concepts on a daily basis in your classroom. However, the way in which they are used here may be slightly different from the way you typically use them. So, I would like to review with you in a systematic manner these concepts. This Case Inventory is only for training purposes. This is not for the case that you will be asked to diagnose (pause for a few seconds).

Let me explain to you in greater detail what you can find under each one of these types of information. If you turn the page to Background, (Experimenter waits for the teacher to turn the page to Background) you can find several types of information as listed on this page (Experimenter points to the list; pause for a few seconds). Do you have any questions? (Pause a few seconds). OK, if you turn now to Comprehension (Experimenter waits for the teacher to turn the page to Comprehension) you can see that you have two major types of information: Comprehension (Experimenter points to Comprehension) and Comprehension Probe (Experimenter points to Comprehension Probe). On pages 2 through 4 you can find definitions and examples of these types of Comprehension tasks. You may take a minute to examine them (pause for a minute). Do you have any questions?

If you turn now to Word Meaning on page 5 (Experimenter waits for the teacher to turn the page to Word Meaning) you can see that the information is presented here in three verbal forms: in Isolation (Experimenter points to

Isolation), in Student Generated Sentence (Experimenter points to Student Generated Sentence) and in Teacher Generated Sentence (Experimenter points to Teacher Generated Sentence). You may take a minute to examine these types of information on page 6 (pause for a minute). Do you have any questions? (answer questions as necessary). If you turn now to Word Recognition on page 7 (Experimenter waits for the teacher to turn the page to Word Recognition) you can see that the information here is presented in several forms. Please take a minute to examine these forms on pages 8 through 12. Let me know if you have any questions. (pause a minute).

The last page in this Inventory (Experimenter waits for the teacher to turn to the last page) is a summary of all the types of information that we have just reviewed in this booklet. This summary is identical to the booklet. To save you time you may use this summary. You may take a minute to re-examine these types of information. (pause a minute).

Let's discuss now how you can request to see a specific type of information. When you diagnose the case, you may request information by referring to the Inventory.

This is the reading passage for the practice case (Experimenter hands out to the teacher the reading passage for Practice Case). All words underlined with (wr) (Experimenter points to "laid") can be requested for Word Recognition (pause a few seconds). All words underlined with (wm) (Experimenter points to "baker") can be requested for Word Meaning (pause a

few seconds).

Now about comprehension questions about the reading passage. We could not anticipate all questions that you might ask and solicit responses from the student. So we prepared lists of possible questions according to paragraphs in the reading passage. When you want to ask questions relating to a specific paragraph, tell me which paragraph it is and whether you would like to ask questions related to listening comprehension, oral reading, reading probe or silent reading. You will then receive a list of questions to examine. For example, if you ask to see questions for listening comprehension from paragraph 1 you will receive this list (Experimenter hands out C-L-paragraph 1). Now, if you want to see, for example, the student's response to question number 3, tell me it and I will give this information to you (Experimenter hands out C-L-P1-3 ; pause a few seconds). You can ask to see a list of questions which are non-paragraph specific, but be sure to indicate whether you want to see oral, silent or listening questions. Do you have any questions? (pause a few seconds).

To help you become familiar with this procedure, we will let you work for a few minutes on a practice case. This case is not one which you will be asked to diagnose. We just want you to have an opportunity to examine forms of information listed on the Inventory without attempting to diagnose the case. You have the Cue Inventory for your practice case.

You may now request a couple of items of information from the Inventory. I will assist you. (limit of 2 items from each one of the four major types of information).

IV. Observational Session

(Take back all materials for practice case). Here is the Case Inventory for the case you will diagnose. Take a few minutes to study this Inventory before we proceed (hand out Inventory and pause for 30 seconds). You can request as many items as you wish, but you must request them one at a time. There is no right or wrong amount of information to request for your diagnosis. Use the same procedure you would use with a child in the classroom. When you request an item of information, I will give it to you. You may keep all items requested throughout the session. Do not feel you must request an item of information because it is present in the Inventory. Do not feel you must request items in the order listed in the Inventory. Do you have any questions?

To review, (hand subject the summary of instructions) the instructions are as follows:

1. A new girl has just joined your classroom and you want to assess her reading performance.

2. Select information you want from the Inventory and ask me to give it to you.

3. When you are ready summarize your opinions about

the child and what you may do for her in the class-
room.

4. Verbalize your thoughts. If it interferes with
   your work, stop verbalizing.

Ok, let's begin. Our case concerns a _____year old
(girl) named _____.

You may take a maximum of one hour for your diagnosis
and 30 minutes to write down your diagnostic opinions. Here
are some initial items of information.

Post observational session instructions

To finish up, we would like you to summarize your
judgments in a written form. Please briefly state your
diagnostic opinions and your suggestions for remediation
on these sheets. Be as specific as possible. In writing
your diagnosis and remediation assume that the report will be
used either by you to work with this child or by a reading
specialist to whom you may refer the child. Please write
as clearly as possible. You may take a maximum of thirty
minutes.

V. Debriefing Session

We now will begin part II of our session. The
purpose is to clarify for us the way you went about making
your decisions. To help you we will review the session with

(CO first name) who has observed you at work. We will hand you the items of information in the order in which you requested them. Then (CO first name) or I will ask you questions or let you comment about your thinking. The purpose of this procedure is to stimulate your recall of your thinking. As we go along (CO) will record your comments on a data record which will be used for later analysis.

Ok, let's proceed (Comment to experimenter): For each time/cue entry on the observation record, use the following procedure:

1. Why did you ask for this piece of information?
   (If subject's response includes items 2 and 3
   or 4, stop).

2. What did it tell you, if anything? (If subject's
   response includes 3 or 4, stop).

3. Did you already have a hunch that this information
   confirmed or ruled out?

NO - (GO TO 4)

YES - What was it?

Was it confirmed or ruled out?

Stop!

4. Did this information give you any new hunch?

NO - Stop!

YES - What was it?

(count as GENERATION Stop!)

Instructions on completion of debriefing for

diagnosis:

E. To complete our work, we would like to give you a

chance to re-write or modify your diagnostic

and therapeutic decisions -- just in case the

debriefing has changed any of your ideas. (hand

subject a new sheet of paper for additions or

changes).

CO: Underline each of the diagnostic categories

mentioned in the written diagnosis. For each of

these terms, CO asks the following questions:

1. Would you define as clearly as possible what you

mean by this term?

2. Can you think of any synonyms for this term?

3. Can you give me some behavioral examples of a

child with this problem?

APPENDIX C

CLASSROOM INTERVIEW

APPENDIX C

CLASSROOM INTERVIEW

1. Experimenter: (Shows teacher descriptions of four children with reading difficulties, two of which are identical to the two simulated cases diagnosed by the teacher in the clinic situation):

   Here are four descriptions of real children with reading problems. As you read through each description, try to see if you can think of a child in your classroom who generally fits the description. Could you please think of children in your classroom who correspond to each of these descriptions? Teacher: (Identify children in the classroom).

2. Exp: (Focuses on one identical child. When possible select a child who corresponds to one of the two descriptions which is identical to the simulated cases, ask the teacher to reread the description):

   Is there anything missing from this description that you can find in your child?

3. Exp: Is there anything in this description that you do not find in your child?

4. Exp: In general, what did you do to find out that this child has these problems?

5. Exp: (For each one of the categories in the description, ask the teacher):

A. Why do you think the child in your classroom corresponds to this description? (or: has this problem?)

B. What sources of information have indicated to you that she/he has this problem?

    (1) Oral reading

    (2) Standardized tests

    (3) Reading related observation

    (4) School records (specify)

    (5) Practice activities

    (6) Other (specify)

C. Why did you collect the above information (cue)?

    (1) Always collect this information

    (2) Because it is important in teaching the child to read

    (3) Not teacher initiated (explain)

D. Why do you think this information (cue) indicates that the child has this problem?

    (1) Reasoned in terms of a Model [pupils who can't do this always have this (problem)]

    (2) Reasoned in terms of experience with other children

    (3) Reasoned in terms of authority (general references to authority (e.g., a book, a course)

    (4) Other (specify)

E. What do you intend to do with (child's name) to remedy his reading problems?

(Exp: Proceeds to the next category in the description

and repeats questions A through E).

6. Do you have any of the following materials?

   A. Tape recordings of the child reading a passage

   B. Oral reading transcription prepared by the teacher

   C. Sample of text used in oral reading

   D. Exercises done by the child and used by the teacher in diagnosis

   E. Exercises given to the child as part of the remediation

   F. Other (specify)

7. (Exp: Starts again with question number two and selects a child. If possible the second choice corresponds to the second description which is identical to a simulated case. Repeates question two through six).

8. Exp: Can you summarize for me the overall method that you use with children in your classroom to find out their reading performance?

9. Could you briefly summarize how you teach reading in your classroom?

10. (Exp:

    A. Asks specific questions in relation to what has been observed during the reading session, or

    B. Describes to the teacher what has been observed during the reading session and asks if the teacher has anything to add to it).

    (Exp: To finish up, let me now ask you some general questions):

11. Do you individualize reading instruction?

12. How do you know when and if you have remediated a child's reading problems?

13. How do you know when to refer a child to a reading specialist?

14. What do you think the reading specialist should be doing?

15. Could you please tell me about what you feel are your responsibilities as a reading teacher?

    Exp: Could you please rank them in order of importance?

16. Which of the following do you feel represents your classroom situation with regard to reading instruction:

    A. I have the time to diagnose all the children in my class.

    B. I have enough time to diagnose individual children who seem to be having trouble.

    C. I prefer that children with reading difficulties be seeing a specialist or consultant.

    D. Time limitations make it impossible for me to do individual diagnosis.

    E. None of the above characterize my classroom.

APPENDIX D

DESCRIPTIONS OF CHILDREN WITH READING DIFFICULTY

APPENDIX D

DESCRIPTIONS OF CHILDREN WITH READING DIFFICULTY

MICHELLE

Word Recognition

Although Michelle has the beginnings of a sight word vocabulary, it is inadequate for her present grade placement. On several occasions she confused visually similar words such as "three" and "there" but after a more careful examination of (these) words she was able to self-correct her initial confusion and to make the fine visual discrimination needed for accurate identification. This skill area needs work and Michelle's complete attention (concentration) needs to be brought to the task.

Contextual Reading

Michelle, in oral reading situations, appears to have some facility with contextual prediction. She is able to effectively use context as a mediating strategy to help her get through a passage and to hold on to the sense of the sentences. However, because Michelle has to stop to decode so many words, her reading is reduced to the level of word-by-word, very choppy reading with frequent disregard of punctuation.

Word Analysis

In the area of phonetic analysis, Michelle demonstrates a mastery of some sound units in isolation. With direct assistance she can accurately blend together sound units. However, she needs to gain more facility in blending. She needs to move toward independent use of phonetic analysis in the actual process of reading. Applying phonics to decode a word is not automatic but she is moving toward this desirable level.

Reading and Listening Comprehension

Both oral and silent reading comprehension appear to be low for present grade placement. The comprehension measures available focused on factual recall of information, a lower skill level in the hierarchy of comprehension skills. One measure of comprehension potential suggests that she can orally understand material at an appropriate level. This suggests that instruction in comprehension coupled with instruction in word recognition strategies will readily enable Michelle to move ahead in reading comprehension. Presently, her deficits in word recognition are holding back her growth in reading comprehension. She cannot understand what she cannot decode.

JIM

Synthesis of Findings

Given extreme difficulties in print translation, Jim

extracts more stated information than might be expected. It suggests that he uses his good meaning vocabulary and conceptual strength to make sense of this passage on the basis of unsystematic information derived from print. Thus, it is concluded that his inferential comprehension skills are well developed in spite of his failure to answer some of the inferential comprehension questions correctly. His major area of reading difficulty is in word identification and he may also have a minor problem in the contextual processing of sight words.

Word Recognition in Context

When orally reading a passage, Jim had difficulty recognizing 19% of the words. Errors were evenly distributed between high frequency sight words and other less common words. Because of the difficulty of the passage, the results of the analysis should be viewed with some degree of caution.

General Observations

On five words Jim dropped or added "s", which suggests the influence of dialect. Few repetitions were made (7); most of these were made (5) in order to correct a previous miscue. One habituated response, "was" for "were", occured three times and might also be a function of dialect.

Sight Words

While many sight words were known by Jim, the proprtion with which he had difficulty was large (10%) and tended to interfere with fluent reading. Many sight word

confusions did not seem to be the result of difficulty with nearby uncommon words. All sight word substitutions (20/20) were cued graphically, typically by initial consonants (16/20). About two-thirds were also cued by prior sentence context. But a large proportion of the substituted sight words (two-thirds) did not conform to the author's sentence meaning. Because of the large number of sight word substitutions and their frequent distortion of the author's meaning, sight words are judged to represent a problem for Jim.

Analyzed Words

Uncommon words were dealt with by Jim either by omission (9) or through substitution (11). He seemed to shift from not attempting uncommon words, to trying to identify them, and then back again to omitting. Contrary to his pattern with sight words where prior sentence context was used only in conjunction with graphic cues, three of ten uncommon words were cued only by prior sentence context. Nevertheless his dominant strategy (50% of substitutions) was to try to use cues from the prior context, from letter sounds mainly at the beginning of the word, and word length. The remaining two words were graphically cued. No noun words were pronounced and there was no evidence that he was attempting to break words into syllables except possibly for the substitution of pic(k) for picnic. He appeared to be using a fairly unrefined method of whole word substitution.

He seemed to try to compensate for his lack of skill in word identification by attempting to make enough sense out of the story to permit him to guess at words. (For example, plates was finally identified and picnic was attempted after several omissions).

Context-Comprehension

Many of his substitutions showed the influence of prior sentence context. He used a correction strategy seven times, usually to replace a substitution that didn't make sense. Sometimes, however, the correction was based apparently on graphic cues (e.g., there/these; maybe/men). Nevertheless, there were instances when substitutions did not make sense and Jim did not attempt to correct. Perhaps what he read did not create sufficient meaning for him to have a basis for correction. On the whole, he appears to be sensitive to contextual meaning and, when possible, to use contextual information as a cue in identifying words.

<div align="center">JOE</div>

General Observations

Joe had difficulty with comprehension of verbal material, whether reading it or listening to it aloud. This conclusion is supported both by his difficulty in answering questions about the story when he was unable to read an answer from the text, and by his teacher's report that he has difficulty understanding directions. His difficulty may

be compounded by poor memory, as evidenced by his incorrect answers to questions (after the listening) which he'd answered correctly when reading from the text. His teacher also reports that Joe seems to have difficulty remembering responsibilities at school.

Context Comprehension

The oral reading probe indicates that Joe can locate answers to questions when the answers are stated literally in the text. The process seems to break down at the point of integrating this knowledge into a more comprehensive structure into which he could channel his own experience. The lack of such integrated understanding prevents him from drawing inferences and impedes memory, since he would probably have to hold in mind many virtually unrelated deatils instead of interrelated components and events which influence each other and have some meaning.

Joe seems to have the meaning vocabulary and experience necessary to understand this story. While his definitions are actually demonstrations and used in sentences, they seem adequate to express his familiarity with the items. He was able to infer an adequate meaning of the one word he didn't know from the context of the teacher's sentence. This evidence indicates that meaning vocabulary is not interfering at this time with his comprehension.

Word Recognition in Context

Joe has some difficulty with print translation. Some attention needs to be paid to his difficulty with endings in context and to a system for attaching unknown words. The fact that he could figure out words when helped to chunk indicates that would be a profitable strategy to teach him -- coupled with visual analogy.

The difficulty with endings suggests that he is not using contextual clues as well as he might. His low rate of corrections also supports this. The "ed" ending seems to present a special case of a misunderstanding about how this ending affects the number of syllables in a word.

DIANE

General Observations

Diane appears to be a well-adjusted, sports-minded, little girl. Her own verbal impression is clear, spontaneous, and adequate for good conversation. Her associations with peers, teachers and parents are positive and her health records indicate no problems. Academically her I.Q. scores indicate at least average intelligence, and she is experiencing good success with school tasks with the exception of reading. There is a bad attitude toward reading developing and possibly a feeling of inability building. Here reading problem appears to center around word recognition skills -- not comprehension. Listening comprehension scores and one-to-one reading test scores indicate good concentration/comprehension though her

attention span shorten when working alone on difficulty

tasks. Diane's reading problem is located primarily in

the decoding area. That is, if she could develop better sight

vocabulary and word attack skills she has the potential to be

an average or better reader.

Sight Vocabulary

Diane's problem areas seem to be concentrated as

follows: The most recurrent problem is the fact that when

reading a word she often looks only at the first letter (or

first few letters) in the word ignoring the middle and end.

From these few cues she guesses an identification -- many

times incorrectly. This makes her a dependent reader and so

she constantly asks for teacher's help.

Word Analysis

Upon an examination of her phonic spelling, it becomes

apparent that word chunks (-tion, -ing, -ack) are not present.

As these are much more regular than single letter sound

connections, they should be worked on.

Word Problems in Context

In looking at her wild guesses, it becomes apparent

that context cues are not being used consistently, and

considering Diane's language abilities and I.Q., this should

be worked on as well.

Lastly, due to her word analysis weaknesses, and low

sight vocabulary (which seems to be due to an insufficient

examination of the word), she struggles to decode. Because

of this she probably can't focus her attention on grammatical markings because she is too busy focusing her attention on figuring out words -- word-by-word.

APPENDIX E

FREQUENCIES OF DESCRIPTIONS OF READING DIFFICULTIES

SELECTED BY TEACHERS IN THE CLASSROOM

APPENDIX E

FREQUENCIES OF DESCRIPTIONS OF READING DIFFICULTIES

SELECTED BY TEACHERS IN THE CLASSROOM

	TEACHERS										TOTAL
	1	2	3	4	5	6	7	8	9	10	
MICHELLE	X		X		X	X	X		X	X	7
JOE		X			X	X		X	X		5
JIM	X	X	X	X			X				5
DIANE				X				X		X	3

DESCRIPTIONS (row label, left of table)

JOE: Corresponds to simulated case No. 7
JIM: Corresponds to simulated case No. 8

APPENDIX F

DIAGNOSTIC DOMAIN: CASE 7 and 8

APPENDIX F

DIAGNOSTIC DOMAIN: CASE 7

DIAGNOSTIC JUDGMENTS

				TEACHERS					
1	2	3	4	5	6	7	8	9	10

Diagnostic Judgment	1	2	3	4	5	6	7	8	9	10
Comprehension: adequate, even when misses some of the questions			X.						X.	
Literal details (sitting, characters): ok					X					
Reads with meaning										X.
Comprehension: poor	X.	X.								
Elements of cause and effect and sequence in the story: missed					X					X
Interpretive comprehension: weak					X					
Intersentence connections: does not seem to make				X						
She may not understand that the "story" line must be constrained by what is printed				X						
Vocabulary concepts: knows major concepts	X		X.		X.					X
Vocabulary: weak							X.			
Concepts: seem to be limited				X.						
Uses examples instead of definitions to define word meanings										X
Reads very well									X	
Reads hesitantly									X	
Oral reading: needs improvement	X									
Punctuation: lacks (punctuation) knowledge			X					X.		
Continues to read without correcting when reading was making little sense	X.									
Word identification: ok					X					
Word recognition: a little shaky	X.									
Looks at the beginning of word and guesses at what it might be			X.			X.				
Endings: ignores	X		X					X.	X.	
Word identification strategies: very weak				X.						
Word substitutions: very close	X									
Treats word as a whole										X

195

	1	2	3	4	5	6	7	8	9	10
Word Identification: miscues at the end of words reflect dialect					X					
Sight vocabulary: good	X.	X.	X						X.	
Recognition: miscues on basic sight words				X.						
Reversals: a problematic area								X		X
Sight vocabulary: has not solidified				X.				X		
Small words (like "to" "how" "and" "his") ignores			X							
Mispronounciation errors" did correct many of them								X.	X.	
Beginning sounds: knows					X			X		
Phonetic skills: lacks										X.
Phonetic analysis: no independent										
Consonants and vowels: needs to be made aware of						X.				
Vowels: need work								X		X.
Chunking: ok					X					
Context cues: ok					X.	X.				
Chunking: does not understand how to chunk				X						
Context: limited use of context to aid in word identification				X.			X.			
Adds extra syllables to words, particularly verbs								X		
Guesses at words rather than analyzing								X.		
Word analysis: weak							X.			
Correction strategies: some	X.									
Language: has a language cultural deficiency						X.				
Language influence from home and neighborhood: is a problem								X		
Grammatical errors (rather than phonetic): many										X
English syntax: poor					X					
If her problem is dialectic then she is reading with meaning			X							
The manifestations of her problems are dialect based				X.						
Assingments: does not understand						X				
Gave vague sentences					X					
Grade level: slightly below										X.
Uncommon word miscues.are not frequent	X									.
X =	6	6	10	9	11	3	3	8	8	8
. =	4	4	4	7	2	3	2	4	3	4

X = mentioned in laboratory
. = mentioned in classroom

DIAGNOSTIC DOMAIN: CASE 8

DIAGNOSTIC JUDGMENTS

	TEACHERS									
	1	2	3	4	5	6	7	8	9	10
Comprehension: adequate	X.	X.	X.	X.						
Oral reading comprehension: good										X.
Understanding: good when listening				X.					X.	
Literal comprehension: adequate					X				X.	
Strategies for getting meaning out of reading: good				X.						
Memory for details: good					X					
Inferential comprehension: weak					X					
Sentences in terms of story context: weak					X					
Word concepts: adequate			X.			X.			X.	
Vocabulary: has a basic vocabulary						X				
Key words: gives satisfactory definitions of					X.					
Word definitions: able to give word definitions with assistance from	X									
Words: skips							X	X	X	X
Makes up her own words								X		
Punctuation: does not pay attention to			X					X.		
Letter "p" words: avoids								X.		X
"w" or "wr" words: avoids								X		
Get better through oral work and reinforcement than written and isolated								X.		X.
Word identification: errors indicate carelessness										X.
Sight words: strong									X.	
Sight word in isolation: ok				X.		X.				
Sight words: weak	X.	X.	X.							
Word reversals: problem area								X		
Words that look alike: mixes								X		
Word substitutions: words she uses for substitutions have about the same	X									
Beginning sounds: knows	X.							X.		

	1	2	3	4	5	6	7	8	9	10
Letter sound associations: knows					X.					
Initial consonants: strong			X.						X	
Syllable clumping: some ability to use										X
Aural sound blending: no problem		X								
Phonic skills: weak		X.	X.						X.	X.
Letter sound associations: weak										
Short vowels: weak			X.							
Long vowels: weak			X.							
Middle and ending consonants: weak			X.							
Syllabication skills: poor		X		X						
Blending: problems with				X						
Vowels and consonants: problems with		X								
Unfamiliar words: no attempt to sound out					X.				X.	
Blends: inconsistent use of			X.							
Sound blending: could blend with help				X						
Sound symbol relationships in isolation: may not know				X						
Compound words: some ability to chunk				X						
Context cues: sometimes uses (context cues) for meaning					X.					
Word substitutions: some are contextually appropriate									X.	X.
Attack skills: lacks	X.	X.								
Strategy to figure out words: lacks		X.							X	X
Correction strategies: does not have			X							
Plural endings: weak			X							
Possessives: weak			X							
Chunking: problems with										
Final "s": problem area								X		
Context to help with the unknown word: does not use				X.						
Generate word families in word analysis: unable to				X						
Language: no language problem at third grade level		X		X						
Dialectical errors don't seem to interfere with sense of story					X		X			
Emotional or social problems may be hampering school work			X							
Conceptual abilities: adequate to the task			X							
Print translation: problem area			X.	X.	X.					
Reading program: lack of continuity for her	X									
Insecure about herself							X.			

Perception problems: possible

	1	2	3	4	5	6	7	8	9	10	$\bar{X}$
X =	7	9	14	12	13	3	2	11	9	10	
. =	4	5	10	7	4	2	1	4	4	7	

X = mentioned laboratory
. = mentioned in classroom

APPENDIX G

LENGTH OF INTERACTION, NUMBER OF CUES COLLECTED AND NUMBER

OF DIAGNOSTIC JUDGMENTS FOR CASES 7 AND 8 AND 10 TEACHERS

APPENDIX G

LENGTH OF INTERACTION, NUMBER OF CUES COLLECTED AND NUMBER OF DIAGNOSTIC JUDGMENTS FOR CASES 7 and 8 AND 10 TEACHERS

	TEACHERS										
STATISTICS	1	2	3	4	5	6	7	8	9	10	X
Time on Task											
Case 7	24	52	39	38	50	35	26	55	34	60	41.3
Case 8	60	42	45	44	57	47	25	60	41	60	48.1
Mean Time	42.0	47.0	42.0	41.0	53.5	41.0	25.5	57.5	37.5	60.0	44.7
Number of cues											
Case 7	36	46	31	47	89	38	17	43	35	41	42.3
Case 8	39	79	32	74	55	69	12	46	45	63	51.4
Mean cues	37.5	62.5	31.5	60.5	72.0	53.5	15.0	44.5	40.0	52.0	46.8
Number of Diagnoses											
Case 7	6	6	10	9	11	3	3	8	8	8	7.2
Case 8	7	9	14	12	13	3	2	11	9	10	9.0
Mean diagnoses	6.5	7.5	12.0	10.5	12.0	3.0	2.5	9.5	8.5	9.0	8.1

APPENDIX H

DIAGNOSTIC DOMAIN BASED ON CLASSROOM INTERVIEWS

DIAGNOSTIC DOMAIN BASED ON CLASSROOM INTERVIEWS

DIAGNOSTIC CATEGORIES	TEACHERS									
	1	2	3	4	5	6	7	8	9	10
Comprehension	X.	X		X.	X.	X	X	X	X.	X.
Oral reading comprehension	X	X.	X.	X.	X.	X	X			X.
Silent reading comprehension	X	X	X.	X	X	X	X			X.
Listening comprehension				X.	X		X			
Factual and inferential comprehension			X						X.	X
Problems getting information in order									X	
Story context				X.				X		X.
Does not use context										
Putting information together										
Vocabulary		X		X.	X.	X.			X.	
Vocabulary meaning in context		X.	X.	X.	X.	X.				
Vocabulary meaning			X		X.		X.			
Forming of concepts			X							
Word recognition	X.	X.	X.	X.	X.	X		X	X.	X.
Sight vocabulary	X.	X.	X.	X.	X.	X	X	X.	X.X	X.X
Reading vocabulary						X				
Words in isolation						X				
Reverse similar words							X			
Cannot pronounce words									X	
Oral and written work								X.		
Word attack	X	X.						X		X.
Word analysis	X				X	X	X.	X		
Decoding	X		X		X	X	X	X		
Endings	X			X	X			X.	X.X	
Drops "s"							X			
Picture clues							X			
Guesses			X.					X.		X

	1	2	3	4	5	6	7	8	9	10
Sees the whole word rather than the parts	X									
Structural analysis	X	X								
Chunking				X	X			X		
Syllables								X		
Compound words								X		
Plurals								X		
Morphophonemic structure				X						
Prefixes				X						
Suffixes				X						X.
Phonetic analysis	X	X.	X	X	X		X			
Sounds	X	X.	X	X	X		X			
Beginning sounds	X.		X.			X	X	X		
Middle sounds	X.		X.			X	X	X.		
Ending sounds	X.		X.			X.				
Consonant sounds		X				X.				
Word family approach	X					X	X	X	X	
Able to sound out	X				X.			X.	X.	
Initial consonants				X						
Letter sound (graphophonemic) correspondance			X.	X.				X.		
Vowels			X.		X.	X		X	X	
Short vowels			X.		X	X	X	X	X	X.
Vowel sounds					X	X	X	X	X	X.
Long vowels						X				
Phonetic clues							X			
Letter sounds							X			X
Leaves vowels out										
Phonetic skills									X	
Blends	X							X	X.	
Written phonetic		X	X.			X	X	X		
Initial sounds			X.			X		X		
Diagraphs						X				X
Blending sounds										
Context	X	X			X	X	X	X		X
Context clues	X				X	X				
Print translation	X	X.	X.							

	1	2	3	4	5	6	7	8	9	10
Oral reading	X.	X	X	X	X	X	X	X	X	X
Fluent reading	X.									X.
Substitutions	X	X					X			X.
Word cause	X									
Miscues				X	X					
Skips words		X.								X.
Corrects her mistakes		X.						X.		
Punctuation					X			X.		
Reading below grade level						X				X.
Child's factors										
Auditory memory	X					X				
Visual memory	X					X				
Learning disability	X								X	
Not paying attention	X									
Memory problem	X									
Auditory sounds	X									
Dialect	X.			X.						
Bilingual			X							
Poor working habits			X							
Speech				X						
Motor coordination					X					
Oral memory						X				
Linguistics						X				
Culturally deprived						X.				
Self concept				X			X.			
Language work								X		
Written work								X		
Physical problems									X	
Attitude toward student									X	
Perceptual problems									X	
Visual problem										X
Poor motor vision							X			
Easily distracted										X
Self centered										X
Immature										X
X =	30	18	22	24	19	26	22	26	17	26
. =	7	7	13	12	3	5	3	8	6	11

X = mentioned in classroom

. = mention in laboratory

APPENDIX I

OBSERVATIONAL STUDY DATA ANALYSIS

SYSTEM (OSDAS) STATISTICS

APPENDIX I

OBSERVATIONAL STUDY DATA ANALYSIS
SYSTEM (OSDAS) STATISTICS

The following statistics are all calculated by (1)
a computer statistical analysis system (Observational Study
Data Analysis System) developed and maintained by the
Institute for Research on Teaching, Michigan State
University, and (2) an interactive statistical analysis
system (MIDAS) at the University of Michigan. A random
sampling of data was computed by hand across numerous
observational studies and the system was found to be operating
accurately.

PROPORTIONAL AGREEMENT

Given a domain for diagnoses/remediations/ or
cues (DX/RX/ or CX) for a given case, proportional agreement
is the proportion of clinicians who mentioned each DX/RX or
CX statement. One proportion is computed for each statement
in the domain.

The statistic is bounded by 0 and 1 and is calculated
by dividing the number of clinicians who mentioned a statement
by the total number of clinicians.

$$P.A. = \frac{Cji}{Cj}$$

where Cji = number of clinicians mentioning the ith category

Cj = total number of clinicians for a given case.

For example, if 3 clinicians of a total of 6 who diagnosed a given case mentioned the category "Basic sight words, weakness", the proportional agreement would be:

$$P.A. = \frac{\text{No. of clinicians mentioning the category}}{\text{Total number of clinicians}}$$

$$P.A. = \frac{3}{6} = .50$$

COMMONALITY

Given a domain for diagnoses/remediations/ or cues (DX/RX/CX) for a given case, the commonality statistic is a measure of agreement between one clinical session and all other clinical sessions for a given case, e.g., an individual is being compared with a group.

The statistic is bounded by 0 and 1. A value of x for a given clinician roughly implies that she/he has included in her/his session x percent of those statements

mentioned most frequently by the group for that case.

For example, a clinician who has a score of .34 has included in her/his session roughly 34 percent of those statements mentioned most frequently by the group.

INTER-CLINICIAN CORRELATION

Given a domain for diagnoses/remediations/ or cues (DX/RX or CX) for a given case, the phi correlation is a measure of inter-clinician agreement. One phi correlation is computed for each pair of clinicians.

The DX/RX/CX categories mentioned by one clinician are compared with those mentioned by a second clinician for the same case. This comparison is summarized in the table below.

CLINICIAN A, SIMCASE Y

		PRESENT (+)	ABSENT (-)
P R E S E N T	(+)	Frequency count of statements in the domain present in both clinicians DX/RX or CX a	Frequency count of statements in the domain present in clinician B's session but not in clinician A's DX/RX/ or CX b
A B S E N T	(-)	Frequency count of statements in the domain present in clinician A's session but not in B's DX/RX or CX c	Frequency count of statements in the domain absent in both clinicians' DX/RX or CX d

CLINICIAN B,

SIMCASE Y

The calculation of the Phi correlation is derived from the table as follows:

Clinician A, Simcase Y

		+	-	
Clinician B, Simcase Y	+	a(++)	b(+-)	a+b
	-	c(-+)	d(--)	c+d
		a+c	b+d	N

$$Phi = \frac{(a \times d - b \times c)}{(a+c) \times (b+d) \times (c+d) \times (a+b)}$$

The statistic is bounded by -1 (statements are in cells b and c only) and 1 (statements are in cells a and d only), only if the distribution in the marginals are equal. In all other cases the maximum and minimum values will be less than 1 and greater than -1.

An example of a completed table is as follows:

Statements of Clinician A, Simcase Y	Statements of Clinician B, Simcase Y	Domain of statements
S1	S1	S1
S2	S2	S2
S3	S7	S3
		S4
		S5
		S6
		S7

Clinician A

	+	−	
Clinician B +	2	1	3
−	1	3	4
	3	4	7

LIST OF REFERENCES

LIST OF REFERENCES

Adams, R.K.   Early identification of potentially retarded
        readers within the school system.   In E.O. Calkins
        (Ed.), Reading Forum (NINDS Monograph no. 11).
        Bethesda, Md: U.S. Department of Health, Education
        and Welfare, 1971.

Austin, M.C.   Diagnostic teaching: The primary grades.
        In J.H. Root (Ed.), Diagnostic teaching: Methods
        and materials.   Syracuse, N.Y.:   Syracuse University,
        School of Education, 1965.

Austin, M.C.   Identifying readers who need corrective
        instruction.   In D.G. Schubert & T.L. Targerson (Eds.),
        Readings in reading: Practice theory research.
        New York; Thomas Y. Crowell Company, 1968.

Bamman, H.A.   Assessing progress in reading.   In R. Farr
        (Ed.), Measurement and evaluation of reading.
        New York: Harcourt, Brace and World, Inc. 1970.

Barr, R. & Sadow, R.   Classroom reading diagnosis and
        instructional planning.   Unpublished manuscript,
        University of Chicago, 1978.

Bateman, B.   The role óf individual diagnosis in remedial
        planning for reading disorders.   In E.O. Calkins
        (Ed.), Reading Forum (NINDS Monograph no. 11).
        Bethesda, Md: U.S. Department of Health,
        Education and Welfare, 1971.

Blount, D.   Competencies essential for diagnosing reading
        difficulties.   Teacher Corps Association: Resources
        for CBTE, no. 6, 1973.   ED 095 151.

Bond, G.L.   Diagnostic teaching in the classroom.   In D.L.
        De Boer (Ed.), Reading diagnosis and evaluation.
        Proceedings of the thirteenth annual convention of
        the International Reading Association, (Vol. 13),
        Newark, Del: International Reading Association,
        1970.

Bond, G.L. & Tinker, M.A.   Reading difficulties: Their
        diagnosis and correction.   (2nd ed.).   New York:
        Meredith Publishing Company, 1967.

Buerger, T.A. A follow up of remedial reading instruction. Reading Teacher, 1968, 21, 329-334.

Burnett, R.W. The classroom teacher as a diagnostician. In D.L. De Boer (Ed.), Reading diagnosis and evaluation. Proceedings of the thirteenth annual convention of the International Reading Association (Vol. 13). Newark, Del: International Reading Association, 1970.

Burnett, R.W. The diagnostic proficiency of teachers of reading. The Reading Teacher, 1963, 16 (4), 229-34.

Carter, H.L.J. The teacher's diagnosis of the disabled reader. In W.K. Durr (Ed.), Reading difficulties: Diagnosis, correction and remediation. Newark, Del: International Reading Association, 1970.

Carter, H.L.J. & McGinnis, D.J. Diagnosis and treatment of the disabled reader. London: The MacMillan Company, 1970.

Cartwright, G.P., Cartwright, C.A., & Yssledyke, J.E. Two decision models: Identification and diagnostic teaching of handicapped children in the regular classroom. Psychology in the Schools, 1973, 10, 4-11.

Dauzat, S.W. Informal diagnosis: The nucleus. In R.A. Earle (Ed.), Classroom practice in reading. Newark, Del: International Reading Association, 1977.

Della-Piana, G.M. Reading diagnosis and prescriptions: An introduction. New York: Holt, Rinehart and Winston, Inc. 1968.

Dietrich, D.M. A diagnostic approach to corrective reading in the classroom. (ERIC Document Reproduction Service No. 063 576). Paper presented at the annual meeting of the International Reading Association, Detroit, May 1972.

Dupuis, M.M. & Ashkov, E.N. Diagnostic teaching in content area reading. In P.D. Pearson (Ed.), Reading: Theory, research and practice. Twenty-sixth yearbook of the National Reading Conference. St. Paul, Minn: Mason Publishing Company, 1977.

Ekwall, E.E. Diagnosis and remediation of the disabled reader. Boston, Mass: Allyn and Bacon, Inc. 1976.

Ekwall, E.E. Teacher's handbook on diagnosis and remediation in reading. Boston, Mass: Allyn and Bacon, Inc. 1977.

Elstein, A.S., Shulman, L.S., & Sprafka, S. Medical problem solving: An analysis of clinical reasoning. Cambridge, Mass: Harvard University Press, 1978.

Farr, R. Reading diagnosis: Trends and issues. (ERIC Document Reproduction Service No. 050 899). Paper presented at the meeting of the Nassau Reading Council, Uniondale, New York, March 1971.

Florida Department of Education, Division of Public Schools, Bureau of Curriculum Services. Diagnostic prescriptive reading instruction. (ERIC Document Reproduction Service No. 149 310), 1977.

Gallant, R. The development of a diagnostic instrument. In R. Farr (Ed.), Measurement and evaluation of reading. New York: Harcourt, Brace and World, Inc., 1970.

Garland, L.H. Studies on the accuracy of diagnostic procedures. American Journal of Roentgenology, 1959, 82, 25-38.

Gil, D., Hoffmeyer, E.C.M., Van Roekel, J.L. & Weinshank, A.B. Clinical problem solving in reading: Theory and research. (Res. Ser. No. 45). East Lansing, Mich: Institute for Research on Teaching, Michigan State University, 1979.

Gil, D., Vinsonhaler, J.F., & Wagner, C.C. Studies of clinical problem solving behavior in reading diagnosis (Res. Ser. No. 42). East Lansing, Mich: Institute for Research on Teaching, Michigan State University, 1979.

Gil, D., Wagner, C.C. & Vinsonhaler, J.F. Simulating the clinical problem solving behavior of reading clinicians (Res. Ser. No. 30). East Lansing, Mich: Institute for Research on Teaching, Michigan State University, 1979.

Glad, J.R. Evaluation of the remedial reading program in Utah Public Schools. Unpublished doctoral dissertation, Salt Lake City, Utah: University of Utah, 1965.

Guszak, F.J. Diagnostic reading instruction in the elementary school. New York: Harper and Row Publishers, 1972.

Harris, A.J. Can the teacher of reading be a diagnostician? (ERIC Document Reproduction Service No. 092 909). Paper presented at the annual meeting of the International Reading Association, New Orleans, May 1974.

Harris, A.J. Diagnosis of reading disabilities. In H.M. Robinson (Ed.), Corrective reading in classroom and clinic. Supplementary Educational Monographs No. 70 Chicago: University of Chicago Press, 1953.

Harris, A.J. The diagnosis of reading disabilities. In A.J. Harris & E.R. Sipay (Eds.), Readings on reading instruction (2nd ed.). New York: David McKay

Harris, A.J. The reading teacher as diagnostician. In R.A. Earle (Ed.), Classroom practice in reading. Newark, Del: International Reading Association, 1977.

Harris, A.J. & Sipay, E.R. How to increase reading ability. (6th ed.). New York: David McKay Company, Inc., 1975.

Harris, A.J. & Smith, C.B. Diagnostic teaching in the classroom. New York: Holt, Reinhart and Winston, 1976.

Hollingsworth, P.M. Diagnosis and prognosis: An interdisciplinary approach. (ERIC Document Reproduction Service No. 042 582). Paper presented at the annual meeting of the International Reading Association, Anaheim, Calif., May 1970.

Jan-Tausch, E. Reading diagnosis: The essential ingredient in teaching every child to read. In R.E. Leibert (Ed.), Diagnostic viewpoints in reading. Newark, Del: International Reading Association, 1971.

Karlsen, B. Reading: Assessment and diagnosis of abilities. In P. Lamb & R. Arnold (Eds.), Reading: Foundations and instructional strategies. Belmot, Calif.: Wadsworth Publishing Company, Inc., 1976.

Kennedy, E.C. Classroom approaches to remedial reading. Itasca, Ill.: F.E. Peacock Publishing, Inc., 1971.

Kress, R.A. Diagnosis: An interdisciplinary approach. In J.A. Figurel (Ed.), Reading and inquiry. Conference proceedings (Vol. 10). Newark, Del: International Reading Association, 1965.

McCarthy, W.G. Diagnosis, prescription, correction and evaluation in the teaching of reading. Contemporary Education, 1971, 42 (5), 233-235.

McGinnis, D.J. The teacher's approach to the study of the disabled reader, A homeopathic concept. (ERIC Document Reproduction Service No. 042 577). Paper presented at the annual meeting of the International Reading Association, Anaheim, Calif., May 1970.

Medrano, P.P. A psychatric perspective of reading disability. In W. Otto, N.A. Peters & C.W. Peters (Eds.), Reading problems: A multidisciplinary perspective. Cambridge, Mass.: Addison-Wesley Publishing Company, 1977.

Monroe, M. Children who cannot read. Chicago: University of Chicago Press, 1932.

Monroe, M. General principles of diagnosis of reading disabilities. In D.G. Schubert & T.L. Targerson (Eds.), Readings in reading: Practice theory research. New York: Thomas Y. Crowell Company, 1968.

Niles, O.S. Diagnostic reaching in the junior high school. In J.H. Root (ed.), Diagnostic teaching: Methods and materials. Syracuse, N.Y.: Syracuse University, School of Education, 1965.

Olson, J.P. & Dillner, M.H. Learning to teach reading in the elementary school utilizing a competency based instructional system. New York: Macmillan Publishing Co., Inc. 1976.

Otto, W., McMenemy, R.A. & Smith, R.J. Corrective and remedial teaching (2nd ed.). Boston: Houghton Mifflin Company, 1973.

Paton, B.C. The accuracy of diagnosis of myocardial infarction. American Journal of Medicine, 1957, 23, 761-768.

Pearson, P.D., & Kamil, M.L. Basic processes and instructional practices in teaching reading (Reading Education Report No. 7). Urbana-Champaign, Ill: Center for the Study of Reading, University of Illinois at Urbana-Champaign, 1978.

Peters, C.W. Diagnosis of reading problems. In W. Otto., N.A. Peters, & C.W. Peters (Eds.), Reading problems: A multidisciplinary perspective. Cambridge, Mass.: Addison-Wesley Publishing Company, 1977.

Peters, N.A.   An interdisciplinary approach to the assessment and management of severe language-learning problems.   In W. Otto., N.A. Peters. & C.W. Peters (Eds.), Reading problems: A multi-disciplinary perspective.   Cambridge, Mass.: Addison-Wesley Publishing Company, 1977.

Rabinovitch, R.   Differential diagnosis in children with reading retardation.   In J.H. Root (Ed.), Diagnositic teaching: Methods and materials. Syracuse, N.Y.: Syracuse University, School of Education, 1965.

Reich, R.R.   More than remedial reading.   In A.J. Harris & E.R. Sipay (Eds.), Readings in reading instruction (2nd ed.).   New York: David McKay Company, Inc., 1972.

Robinson, H.M.   Why pupils fail in reading.   Chicago: University of Chicago Press, 1946.

Satz, P.   Reading problems in perspective.   In W. Otto., N.A. Peters, & C.W. Peters (Eds.), Reading problems: A multidisciplinary perspective.   Cambridge, Mass.: Addison-Wesley Publishing Compnay, 1977.

Sawyer, D.J.   The diagnostic mystique - a point of view. The Reading Teacher, 1974, 27 (6), 555-561.

Sawyer, R.   Diagnosis for the classroom teacher   (ERIC Document Reproduction Service No. 029 754).   Paper presented at the conference of the College Reading Association, Knoxville, April 1968.

Sheldon, W.D.   Specific principles essential to classroom diagnosis.   In D.G. Schubert & T.L. Targerson (EDs.), Readings in reading: Practice theory research. New York: Thomas Y. Crowell Company, 1968.

Sheldon, W.D.   Teachers in grades K-12 diagnose reading problems.   In J.H. Root (Ed.), Diagnostic teaching: Methods and materials.   Syracuse, N.Y.: Syracuse University, School of Education, 1965.

Sherman, G.   A model of reading and learning to read.   East Lansing, Mich.: Institute for Research on Teaching, Michigan State University, in preparation.

Sherman, G.   Training reading specialists in diagnosis   (Res. Ser. No. 31).   East Lansing, Mich.: Institute for Research on Teaching, Michigan State University, 1978.

Sherman, M. Psychiatric insights into reading problems. In
        D.G. Schubert & T.L. Targerson (Eds.), Readings in
        reading: Practice theory research. New York:
        Thomas Y. Crowell Company, 1968.

Smith, C.B. Correcting reading problems in the classroom.
        Newark, Del.: International Reading Association, 1969.

Smith, C.B., Carter, B., & Dapper, G. Treating reading
        difficulties: The role of the principal, teacher,
        specialist, administrator. Washington, D.C.: U.S.
        Deaprtment of Health, Education, and Welfare, 1970.

Smith, F. Understanding reading: A psycholinguistic
        analysis of reading and learning to read. New York:
        Holt. Reinhart and Winston, Inc., 1971.

Spache, G.D. Clinical diagnosis in the classroom. The
        Reading Teacher, 1960, 14, 14-18.

Spache, G.D. Diagnosing and correcting reading disabilities.
        Boston: Allyn and Bacon, Inc., 1976.

Spache, G.D. Diagnosis of reading problems. The Elementary
        School Journal, 1955, 56, 18-26.

Stephens, E.L.A. A study of the problem solving behavior
        of teachers as they diagnose a child's reading
        performance and the effects of experience and training
        on that behavior. Unpublished doctoral dissertation,
        Michigan State University, 1978.

Stevens, D.O. Reading difficulty and classroom acceptance.
        The Reading Teacher, 1971, 25 (1), 52-55.

Strang, R. Diagnostic teaching of reading. New York:
        McGraw-Hill Company, 1964.

Strang, R. Levels of reading diagnosis. Educational Forum,
        1969, 33 (2), 187-191.

Strang, R. Reading diagnosis and remediation. Newark,
        Del.: International Reading Association, 1968.

Swalm. J.E. Diagnostic teaching: A method for assessing
        reading skills. In M. Kling (Ed.), Language develop-
        ment for the classroom and remedial reading.
        Proceedings of the fall 1972 Rutgers University
        Reading Confernece, New Brunswick, 1973. (ERIC
        Document Reproduction Serivce No. 140 260).

Van Roekel, J.L. & Patriarca, L. Do reading and learning disability clinicians differ in their diagnosis and remediation? Paper presented at the annual meeting of the International Reading Association, Atlanta, April 1979.

Vinsonhaler, J.F. Clinical problem solving among reading specialists: The problem of agreement on a diagnosis. Paper presented at the annual meeting of the International Reading Association, Atlanta, April 1979.

Vinsonhaler, J.F., Wagner, C.C. & Elstein, A.S. The Inquiry Theory: An information processing approach to clinical problem solving research and application. Medinfo '77. Proceedings of the Second World Conference in Medical Information, 1977.

Wagner, C.C., Kitchen, F., Polin, R., Vinsonhaler, J.F., Van Roekel, J.L. & Gil, D. Observational studies: Data analysis system. (Tech. Rep). East Lansing, Mich.: Institute for Research on Teaching, Michigan State University, 1979.

Weule, G.G. Diagnosis and treatment of reading problems: The teacher's role. The Slow Learning Child, 1971, 18 (3), 168-188.

Weinshank, A.B. An observational study of the association between diagnosis and remediation in reading. Ph.D. dissertation, Michigan State University, in progress.

Weinshank, A.B. The relationships between diagnosis and remediation in reading: A pilot study. (Res. Ser. No. 37). East Lansing, Mich.: Institute for Research on Teaching, Michigan State University, 1979.

Weintraub, S., & Farr, R. Introduction. In R. Farr, S. Weintraub & B. Tone (Eds.), Improving reading research. Newark, Del.: International Reading Association, 1976.

Whitcombe, L.M. Overcoming reading difficulties and the effect on personal development. In R.T. Williams (Ed.), Insights into why and how to read. Newark, Del.: International Reading Association, 1976.

Wilson, R.M. Diagnostic and remedial reading for classroom and clinic (3rd ed.). Columbus, Ohio: Charles E. Merrill Publishing Company, 1977.

216

Yerushalmy, J. Reliability of chest radiography in the diagnosis of pulmonary lesions. <u>American Journal of Surgery</u>, 1955, 89, 231-240.