A Model Systems Approach to Reading Instruction and the Diagnosis of Reading Disabilities

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MC: Idea is to answer Fodor's argument ⇒ identify pre-existing cognitive structures & process of externalization

DB: PAP may have called modularity argument

Rearranging parts of the system give rise to new yields emergent system not present to begin with.

Introduction

This paper is addressed to a persistent problem confronting both educational researchers and practicing teachers: Despite intensive efforts in recent decades, large number of American children fail to learn to read at a level which will enable them to comprehend novel texts of the kind currently expected of them in the conduct of their everyday lives and in the workplace (Miller, 1988). Within this very broad area of concern we will focus on the special challenge to psychological theory and practice posed by children variously labelled as "learning disabled" or "reading disabled" and the closely associated difficulties confronting teachers who are attempting to teach such children to read.

The bulk of this chapter will be devoted to presenting an approach to understanding the process of reading acquisition and the nature of reading disabilities that is distinctive in several respects. Unlike most research by cognitive psychologists on this topic, we do not rely heavily on either psychometric or experimental methods as these terms are generally understood. In the first study we report on here we did not assign children at random to different treatments based on prior diagnosis using standardized tests or experimental procedures, nor did we constitute a control group to measure the outcome of the remedial procedures we employed. Instead, we designed a form of reading activity to be conducted in small (4-8 person) groups composed of participants with heterogeneous levels of reading skill. In every experimental session we attempted to insure that all participants engaged in an activity that we can provisionally call "reading for meaning." Differential ability to coordinate with others in this whole group activity and changes in the patterns of discoordination over time then constituted our evidence both about the specific difficulties encountered by individual children and the success

of our procedures for purposes of remediation.

We have divided our presentation into five sections. Section 1 will review briefly the evidence that learning disabilities pose particularly difficult methodological problems to psychologists and educators who would seek to understand and remediate them. In Section 2 we will present our view of the fundamental structure of reading as a specific form of mediated human activity, and discuss two currently well known views of the process by which reading is acquired in the course of classroom teaching/learning processes among elementary school children. We will conclude that while each of these views has useful features, we will reject them in favor of a developmental-learning theory of reading acquisition inspired in large part by the work of psychologists associated with the socio-historical school (L.S. Vygotsky, 1978; A.R. Luria, 1932; A.N. Leontiev, 1981). In Section 3 we will describe the experimental procedure that we devised to instantiate our theory of reading acquisition with groups of elementary school children selected by their teachers as reading disabled or very poor readers. In Section 4 we will illustrate how this procedure works to provide the educator with finely tuned diagnostic information about individual difficulties in acquiring reading in the process of teaching itself. This section ends with a brief report of a followup study employing a traditional experimental design. Finally, in Section 5 we summarize our results to date using the new procedure, their relationship to other current work on reading disabilities, and prospects for further research and applications.

Section 1: The Methodological Puzzle of Learning Disabilities

The methodological problems of studying learning disabilities are reflected in the many definitions of what a learning disability is and who the learning disabled are. The United States Congress has defined the concept of learning disability both in terms of what it is, and what it is not. The category includes:

> Those children who have a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such disorders include such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, or mental retardation, of emotional disturbance, or environmental, cultural, or of economic disadvantage. [PL 94-142, Section 5(b)]

Converting this kind of definition into diagnostic and pedagogical practice has proven extremely difficult. The publically specifiable parts of the definition seem unproblematic enough: LD children have difficulty using language in its many different manifestations, especially those that are involved in the mastery of basic literacy and numeracy skills. But when we move from verbal definition to scientific practice, chaos reigns.

One source of confusion is the assumption that it is possible to move from behavioral deficits back to the psychological processes which assemble them with enough precision so that one can reliably distinguish (for example) between a child who has a specifically disordered understanding of language that "manifests itself in an imperfect ability to read" from a child who manifests similar behavior owing to an out-of-school cultural experience unlike the norm. This presumption is false. Anderson (1982) points out that even

experimentally-based cognitive research on LD children encounters disabling heterogeneity in the basic contrast groups. A second problem is identified by Torgesen and Houck (1980, p. 159), who have pursued the goal of process-oriented research on sub-groups of LD children presumably homogeneous with respect to process-based test performance. They note that: "...the presumed link between processing deficits measured by diagnostic tests and learning performance problems in school has not been established." (For more detailed discussions, see Torgesen & Wong, 1986; Vaughn & Bos, 1987). Sylvia Farnham Diggory summed up this point quite frankly more than a decade ago: "No one has any certainty about what is really wrong with these children" (1978, p. 5). This statement remains true today (Ellis, 1985; Seidenberg, Bruck, Fornarolo, & Backman, 1986). Faced with this unpleasant fact, psychologists and educators adopt a variety of practical strategies which they hope will eventuate in scientific understanding and benefit the affected children.

The basic constraint in specifying who is to be considered learning disabled is that the children no be counted among the retarded. This means that the child's IQ must remain in the normal range, which in practice, means an overall IQ between roughly 80-110 (or 75 and 115 if somewhat looser criteria are employed). Within this normal range, a child is usually considered LD only if there is a significant discrepancy between different sub-scales of the overall IQ test. The most inclusive such definition rests on a binary division of the IQ subtests into Verbal and Performance subscales (Wechsler, 1949, 1974; Owen, Adams, Forrest, Stolz and Fisher, 1971; Kaufman, 1979).

In the hands of some practitioners, refinement of the psychodiagnostic techniques is carried out in a clinical model that begins with a binary split between "verbal" and "performance" scales. It then splinters into as many sub-test patterns as the clinician needs to come up with a diagnosis that can motivate a particular program of remediation (Kaufman, 1979). Others propose clusters of psychodiagnostic categories which fit or follow neuropsychological rationales, and prepare systems of remediation intended for the schools (Bannatyne, 1974).

McKinney (1984) reviewed various methods for sub-typing LD children and syndromes. In spite of the existence of a great deal of research, McKinney (1984, p. 48) found the literature "still at a very embryonic stage." He called for more research to arrive at categories that (1) can yield "a more generalizable body of knowledge in the field;" (2) can improve diagnostic practice since "the field can no longer tolerate the extent of misclassification that seems to exist today;" and (3) that would support further studies of remediation "to test the efficacy of alternative interventions for LD children by using trait x treatment paradigms."

Whatever the usefulness of psychometric approaches for further research or when applied in conjunction with individualized programs of remediation guided by a skilled clinician, they are of very limited help to the classroom teacher. There is no agreed upon theory of what specific and distinctive processes are measured by the performance and verbal subscales of the standardized IQ tests nor does knowledge of such scores specify remedial activities. One might hope that more specific tests, like tests of reading, would be more helpful; however, Chall makes a similar complaint about standardized

reading tests. Standardized reading tests, she wrote, do not provide

> specific aspects and components of reading that have been mastered and those yet to be acquired. As is the case with most intelligence tests, no provision is made for translating the scores into qualitative descriptions of the reading process that suggest the necessary next steps for instruction and practice. This is particularly important in providing for the millions who have serious reading problems. (1979, p. 47)

The great uncertainty facing researchers and teachers with respect to the diagnosis and remediation of learning disabilities is one of the few really consistent themes in this literature. Hallahan concluded his survey of the field a decade ago with the comments that

> ...because of the generally pervasive problems related to methodology and because of the relatively recent movement toward using experimental laboratory tasks instead of standardized tests, we find ourselves in an extremely primitive stage of knowledge concerning psychological characteristics of learning disabled compared to normal children...In general, the only thing one can say with assurance is that learning disabled children have IQ's as high as normals but still evidence learning problems in school." (Hallahan, 1975, p. 53)

This is indeed a gloomy assessment. Equally gloomy has been the fate of the research program Hallahan suggested as a remedy. The passage of time and the addition of more experimental studies have not substantially changed the picture (Stanovitch, 1988).

Institutional reflections of diagnostic uncertainties.

These uncertainties about underlying processes and the heterogeneity of the groups of children who display normal IQ profiles, yet struggle excessively with the elementary school curriculum, create a very difficult situation for teachers who are charged with responsibility for remedial instruction. When teachers refer children to a school psychologist because they are

experiencing unusual difficulty in the classroom, the psychologist must rely on criteria of unknown validity and questionable reliability to come up with a diagnosis and recommendation. In making a recommendation for special educational treatment, the psychologist is also limited both by existing testing methods and the availability of suitable care.

Research by Mehan and his colleagues, as well as evidence from the school in which we have been working, show that very often children are placed in a situation where special care is available in the form of reduced class size and special pull-out activities, even if the child does not technically fit the appropriate category. For example, children experiencing classroom difficulties are sent to either emotionally handicapped or learning disabled special classes depending upon space and funding available at a certain time of year (Mehan, Hertweck, & Miehls, 1986). Given the overlap in criteria used to assign children to these categories, it seems pointless to blame on-site psychologists for such decisions. After all, the smaller size of remedial classes may well provide the children with a denser educational experience, valuable in itself.

What is to be done?

Our reading of the literature on psychodiagnosis and classroom assignment procedures makes it clear why the children and teachers often find themselves in a difficult situation in the classroom. [1] Tests constructed for purposes of

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1. Olsen and Midgett (1984) similarly point to the problems faced by teachers who need a "broad array of remedial strategies, especially in the area of written language" (1984, p. 103) to cope with the heterogeneity of the student population. Their conclusion is based on a study which failed to find any consistent basis for the assignment of some children to full-day self-contained classes for LD treatment and others to a pull-out program, receiving

diagnosis are instead used to justify choices made on other grounds. All that the children share in common is their inability to read. What seems to occur regularly in these circumstances is the adoption of the pedagogical strategy so widely observed in remedial reading classes that we remarked on earlier; the teacher starts at "the beginning" with letter identification and letter-sound correspondences, hoping that the debilitating effects of prior failure can be overcome by systematic review and practice.

Cognizant of these difficulties, we set out to create a form of reading activity that would be appropriate for use in small groups of readers with heterogeneous abilities. We also sought to make this activity support the diagnosis of reading difficulties encountered by each member of the group and provide for effective remedial instruction at the same time.

To make clear the logic upon which our approach was based, we will need first to specify clearly what we conceive the whole act of reading to be and to characterize the process of acquisition. Then we will need to find a way to instantiate our conception of reading in a real life setting that has potential for diagnosis and remediation.

Section 2: The nature of reading and its acquisition

As Wolf (1976;1977) has pointed out, the concept of reading both predates and is broader than the common sense idea that reading is the process of constructing meaning from written texts. It has always been the case that people have been able to "read the situation" or "read the expression" on another's face and children certainly possess this broad ability well before they arrive

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special treatment for only part of the day.

at school. It is also true, as Richard Anderson and his colleagues have emphasized, that reading is a "complex skill requiring the coordination of a number of interrelated sources of information " (Anderson, Hiebert, Scott, and Wilkinson, 1985). Our own definition of learning builds upon this consensual foundation, but specifies the essential features of reading in somewhat different terms. We define reading as expanding the ability to mediate one's interactions with the environment by interpreting print. There are two important aspects of this definition:

1. Learning to read and proficient reading are both subsumed in the same definition. What one learns to do is to expand; what one does, having learned, is to continue expanding. We see reading as an "ill-structured" task, where some of the goals and conditions must be constructed as a part of the performance. (See Greeno, 1978, for a discussion of ill- structured tasks.)

2. Comprehension is defined as mediating one's interactions with the environment and includes text-processing (interpreting letter groups) as a condition. There is no dichotomy of comprehension and decoding.

This mediated interpretive activity is what disabled readers are not doing. The interesting questions are, what are they doing when they are not doing what we recognize as reading and how can we arrange for them to acquire a new, more adequate, system of mediation via print? Put slightly differently, how can we arrange for the re- mediation of reading? To answer such questions it is necessary to create a form of reading instruction such that whether or not children are proficient readers they are still expanding their ability to mediate their interactions with the environment by interpreting print, i.e., they must be engaged in a full act of reading, not a disembodied skill, hypothesized component, or hypothesized analogue task.

If this requirement does not seem difficult to achieve, we can translate it into a familiar rhetorical question: how could it be possible for children to comprehend text that they cannot read? From a theoretical point of view there is a no less compelling question: how can "higher" levels of the system of reading arise if they are not there to begin with? These are classic questions in the study of development (Piatelli-Palmarini, 1980; Hamburger, 1957) urging on us the idea that we should treat the acquisition of reading as a developmental process, requiring the reorganization of primitive functions already present.

Representing Reading

We begin by referring back to our definition of reading as interpreting the world with the aid of print, this time in terms of the diagram in Figure 1.

Insert Figure 1: A Static Representation of Direct and Indirect Access to the World.

This diagram is a barebones representation of the idea that reading in the broadest sense can, and perhaps must, be simultaneously accomplished by two routes: direct and indirect. Any reader must "see" the world as refracted through the text; but in order to do so the reader's more direct access to the world, topicalized by the text, must be simultaneously engaged. Whether a reader accepts, rejects, or adopts a "wait and see" attitude toward the text-mediated interaction with the world, a more immediate interaction with the world must be coordinated with it.

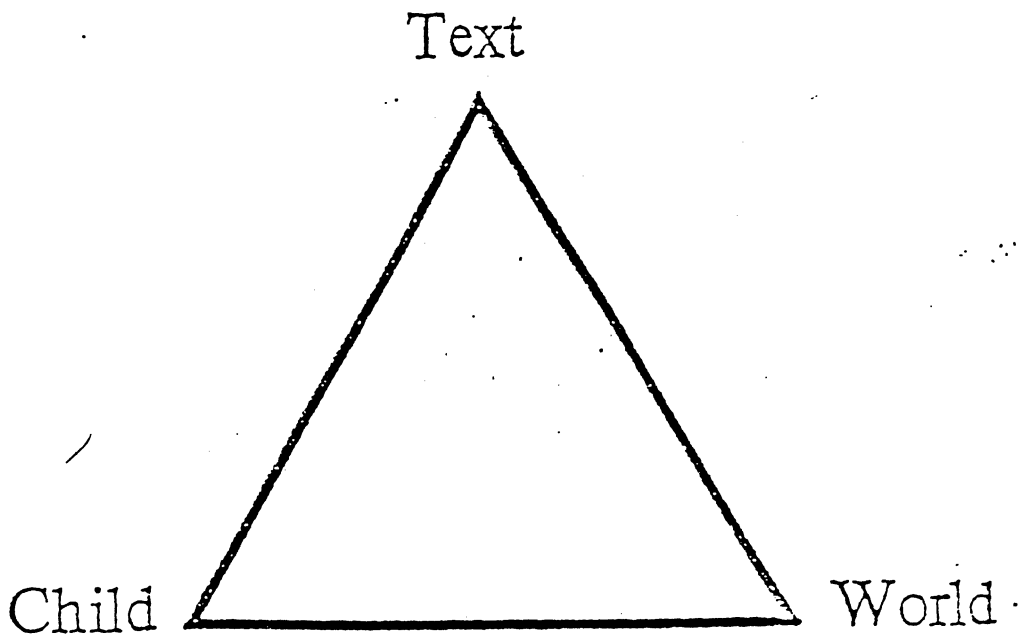

Figure 1: Static Representation of Direct and Indirect Access to the World

While a "two route" theory has been long familiar in reading research (Estes, 1979; Warrington and Shallice, 1980), we wish to provide a different characterization of the identity of the routes and a different view of how they are related in the system. In the case of previous reading research the two routes can be named "direct retrieval of words" and "indirect retrieval of words via a phonetic code (or orthographic patterns)." In this previous research (e.g., in studies of acquired adult dyslexia Boder, 1973), it is reasonable to assume that, once retrieved, words are automatically coordinated with non-text mediated interpretations of the topicalized world; the focus, then, can be on characterizing as direct or indirect the relationship between the reader and printed words. According to our representation, this process is only <u>one link</u> in "<u>one route</u>" (viz., the Child-text link in Figure 1). Because we are dealing with beginning readers whose modes of mediation involving print are known to be problematic, we cannot make any assumptions about automatic coordination between mediated and non-mediated interpretations, even if word retrieval is achieved by one of the routes. [2]

Since the two routes studied in word retrieval research are generally seen as alternatives in a system. It is reasonable to assume that a reader could use either one route <u>or</u> the other in the context of word retrieval

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2. "Word barking" is an expression applied to the case of youngsters who appear to accomplish word retrieval without arriving at a text-mediated interpretation of the world. We suspect that there also exists "sentence (and paragraph) barking" as well as a written version of it that turns up in answer to comprehension quiz questions. When "barking" is done in response to an oral or written question, it is the basis for what we call "copy-matching."

research. [3] Reading in our sense, however, requires the coordination of the two routes considered at our more inclusive level of analysis. Viewed in this way, Figure 1 can be said to represent the idea that reading requires the constant interaction of "bottom up" (feature--> letter--> word--> phrase--->.....) and "top down" (knowledge-based, comprehension-driven) processes out of which new schemas (interpretations of the world emerge) (McClelland and Rumelhart, 1981).

Once we move on to the issue of reading acquisition a shortcoming of Figure 1 becomes immediately apparent: It represents a timeless ideal. In contrast, a completed act of proficient reading creates an "as if the same" relation between the "worlds" as "top down" and "bottom up" processes are momentarily coordinated. Even among skilled readers, the act of coordinating the two routes may require adjustments in the representation of the "world" arrived at by either route. It is in the coordinating process that new representations emerge. The slight discoordination in Figure 2 displays the dynamic process we have in mind more accurately.

Insert Figure 2: Coordinating Direct and Indirect Routes

Figure 2 explicitly indicates the fundamental elements of the process of reading as a mediated, constructive, process:

1. the non-identity of the worlds represented in the two routes (W_{ct}, the mediated route, and W_n, the direct route);

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3. The choice of routes may be constrained on some occasions (e.g., when orthographic irregularities call for a more direct route).

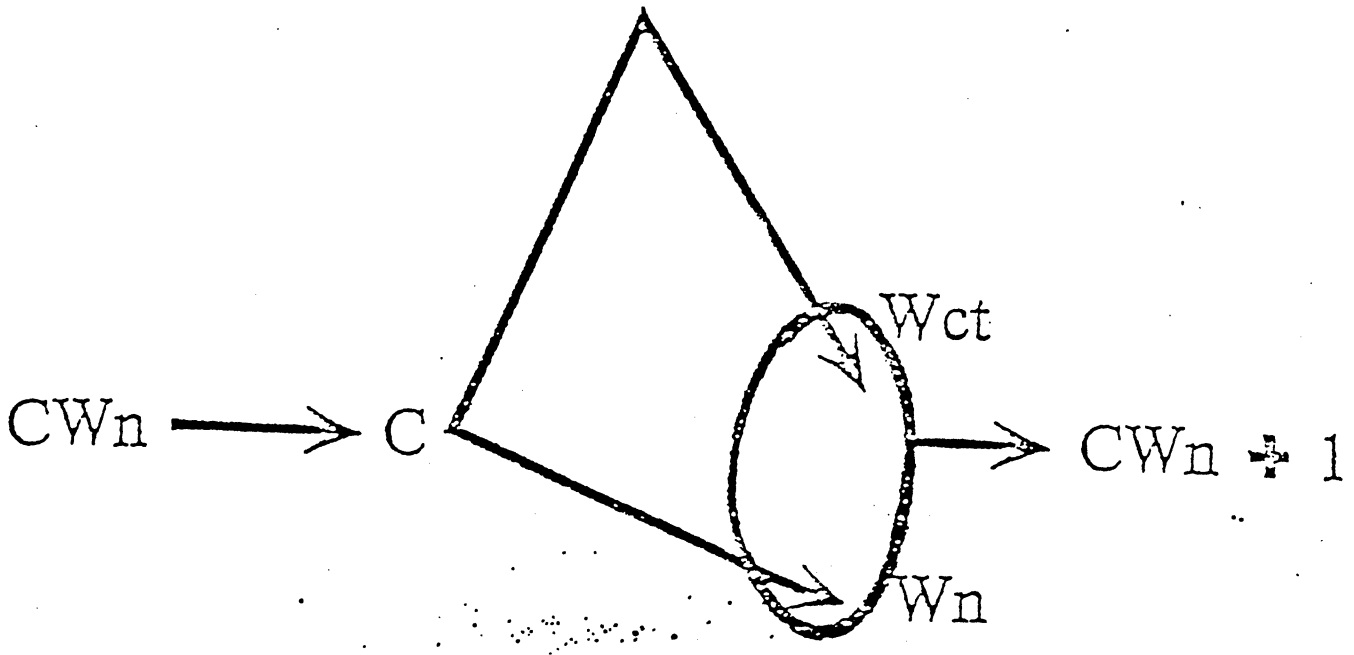


Figure 2: Coordinating Direct and Indirect Routes

2. the need to coordinate them (W_{ct} is not identical to W_n);

3. the emergence of a new representation (CW_{n+1}).

The development of reading

Using the schema in Figure 2 as a background we can compare competing accounts of school-age reading development which might motivate alternative strategies for remediation.

For many decades, psychologists interested in the development of reading have engaged in a "great debate" (Chall, 1979) about whether instruction should begin with an emphasis on teaching children the relationship between alphabetic symbols and sounds, or with the recognition of whole words (a "comprehension emphasis"). It is our reading of the literature that the basic division between a code emphasis vs comprehension emphasis, is a mistake. (cf. Shuy, 1979). Somehow, reading activities must be created which are a theoretically motivated blend of both the activities provoked within a code emphasis and those provoked within a comprehension emphasis. Adopting the terminology of interactive activation models of learning for a moment, we can say that the whole act of reading emerges only when there is an appropriate balance between "top-down" (comprehension) and "bottom-up" (code-derived) processes (McClelland and Rumelhart, 1981). The goal of instruction, therefore, should be to bring about this balance.

To keep the discussion at a manageable length, we will focus on the work of Chall (1979) and of Goodman and Goodman (1979), whose theories of the process of acquisition motivate different procedures of reading instruction.

Chall begins with a "code emphasis" while the Goodmans insist on the priority of comprehension. We, in turn argue for the need to integrate and balance the processes termed "comprehension" and "decoding."

There are two points where our ideas fit closely with both Chall and the Goodmans: the beginning state and the end state. Like them, we assume that children come to initial reading instruction with a prior ability to mediate their interaction with the world by means of language. That is, they can "read the world" as a precondition for "reading the word." We are also in agreement concerning the end state of mature reading; the mature reader, it is assumed, can coordinate direct interpretation of the world and interpretation mediated by print within a single system of activity in which information from the text and prior information both contribute to the overall cognitive/interpretive process. However, we disagree about the process of change from the beginning to the end state, that is, the process of acquisition. This disagreement is crucial, because it is barriers to effective change that must be the focus of educational diagnosis and remedial instruction.

The Chall Model.

Chall (1967, 1979) proposes a complex view of reading acquisition, involving reorganizations characteristic of a developmental theory. The basic task of Stage 1 is to learn the arbitrary set of letters in the alphabet and to decode the way in which they correspond to the sounds of spoken English.

In terms of our basic representation of reading (Figure 1), this "code emphasis first" strategy seeks initially to build a Child-Text link (CT) via the alphabetic principle.

Chall conceives of Stage 2 as the period when new readers confirm and solidify the gains of the previous stage, moving from relatively halting and uncertain application of their decoding skills to rapid and fluent decoding. They no longer read letter by letter or word by word, and they begin to be able to think about the topic while reading about it, a process that Chall refers to as "ungluing." Chall suggests that automaticity of decoding (CT) can be promoted as children read texts that require little expenditure of effort on comprehension; hence, during Stage 2, the children read familiar texts. The effects of this strategy in terms of our definition of reading is to facilitate links between the world indexed by the text and the child's prior expectations because the information in the text has been deliberately rendered redundant. Unfortunately, this strategy achieves the coordination of the two worlds by default! Stage 2 can be described as a "World recognition" process: the text says the same thing the reader says about the world. Assuming identity, the child comprehends the text, but since there in no expansion (because there is no new act of interpretation required) this cannot be the end state.

It is only in Stage 3 that children are expected to engage in the expanding, interpretive process that we believe to be at the heart of reading. As Chall put it,

> During Stages 1 and 2 what is learned concerns more the relating of print to speech while Stage 3 involves more the relating of print to ideas... It is with the beginning of Stage 3 that reading begins to compete with these other means of knowing (Chall, 1983, pp. 20-21).

In terms of our model, the reading materials presented to the children in Stage 3 require juxtaposition of prior knowledge of the world and the world indexed by the text. The result of this juxtaposition is the full act of reading as we conceive of it, an act which expands the readers ability to

interpret the world using print, resulting in a modified Child-World relationship (CWn+1). According to Chall, higher levels of reading are subsequently attained when children learn to adopt multiple viewpoints in their reading and to approach text flexibly as problem solving tools. Since we are dealing in this paper with children for whom it would be considered a great victory to arrive at Chall's Stage 3, we will concentrate our attention on the conditions she believes essential to reach this state.

In contrast to the developmental transition from Stage 2 to Stage 3, where the mechanism for the emergence of the TW link is a recognition of redundancy, the mechanism for the emergence of CWn+1 in State 3 is more difficult to specify. The condition for change is apparent: the non-identity between the Worlds specified by the TW link and the CW link under conditions of a firm CT link. But Chall is quite unclear about the actual mechanism of change. We take two hints from her writing. First, she suggests that successful mastery of Stage 2 (where decoding has been automatized) provides the learner with an extra allowance of mental resources that can now be dedicated to comprehending less familiar Text Worlds. Second, she declares that her theory of the process of change has been inspired by Piaget's work on development.

In our opinion, neither of these hints provides us with a sufficiently well specified strategy of instruction, either for the beginning reader or disabled readers who have failed to achieve the earlier developmental steps. While automaticity of decoding may, in fact, be helpful in promoting "reading to learn," there is no theory of how the newly freed-up mental resources should be allocated. The familiar phenomena of children who are "good

decoders" but who fail to make the transition to Stage 3 indicates that we will need a more refined theory to guide remedial efforts. Nor does the invocation of Piaget help a great deal. One is still left with the unanswered problem of how the processes of assimilation and accommodation enter into the proper dialectic interaction to create new, more powerful stages. And, as a theory that emphasizes independent invention, Piaget's approach provides us with no hints at all about the role of the teacher or the instructional processes in reading development.

The Goodmans' Model.

In contrast with Chall's developmental model of reading acquisition, the Goodman and Goodman (e.g., 1979) view of children's entrance into literacy is non-developmental in the sense that it focuses on a process of change that does not imply emergence or reorganization of the elements of reading. According to the Goodmans, from the very beginning reading remains the same activity, but for young children interactions with the world that include interpreting print are fewer in number, and are less flexible in terms of the functions that are fulfilled. This means that according to the Goodmans' model, new representations of the topicalized world (CWn+1) begin to arise even in the earliest encounters with print. The familiarity or novelty of text information has no special status in this model, except as an indicator of the proficiency of a reader in the final state. Instead, the widening range of functions that reading can be mediated by has the special role of differentiating early and later states of reading proficiency. (The concept of a function, in this model, derives from Halliday's (1975) account of language development. An instrumental function, for example, is often encoded as "I

want..." and advertisements can be seen as the related literacy materials; the regulatory function, "do as I tell you," can be related to a "STOP" sign.)

The Goodmans' model construes written text as a pervasive cultural tool. They argue that, in a literate society, experience with various functions often includes their printed expressions. What distinguishes advanced from beginning readers is that the latter have a smaller inventory of functions. The child may or may not attend to the textual part of the context (CT); and, the meaning specific to the text (TW) is not essential to the operation of the function. As functional experiences proliferate, the role of the text in differentiating among functions provides occasions for a more constrained treatment of the text. The need to handle multiple functions flexibly leads children successively to fine-tune their ability to discriminate textual symbols (CT) and to attend to the world as mediated by the the text (TW).

There is no systems reorganization or emergence of structures specific to reading; change is the reflection of a widening pool of human interactions in a literate society; the mechanisms involved are accretion of experiences and differentiation among the elements within experiences. Ultimately, an act of reading, including novel text unfamiliar to the Child-World link, can enter into a variety of functions rather than being governed by, or identified with, any constant single function.

A mediational model

Like Chall, we believe that reading is a developmental process and that the goal of reading instruction is to provide means for children to reorganize their interpretive activity using print. Like the Goodmans, we believe that

reading text is a specialization of the pre-existing ability to "read the world" using signs of various kinds. We differ from each of these approaches in two, interrelated ways. First, we believe that beginning instruction (and remedial instruction) should emphasize both decoding and comprehension in an integrated activity that includes the whole act of reading (e.g. activity in which children from the start are supported to expand their ability to mediate their interactions with the world via print). Second, we believe that under ordinary circumstances adults play a key role in organizing the requisite developmental process. And when children experience difficulty the role of the adult becomes even more important. (Chall and the Goodmans would most probably agree to this second statement, but their theoretical approaches do not clearly specify the role of the adult in creating the conditions for developmental change.)

Our adoption of a developmental account of reading combined with our commitment to practical applications of our ideas for purposes of organizing remedial instruction requires us to deal in full seriousness with what has come to be known as the "paradox of development" (Fodor, 1983) or the "learning paradox" (Bereiter, 1985?). To whit: it is impossible to acquire a more powerful cognitive structure unless, in some sense it is present to begin as a cultural practice with. Thus, for example, physical development can be accounted for by invoking the genetic code. Such development is generally conceived of as a form of maturation which does not require the kinds of constructive processes invoked by Piaget in his account of psychological development. In Chomsky's well known characterization of language acquisition, language is not constructed, it is "triggered." We believe that Fodor's argument has quite general force, applying to any developmental theory, in particular a developmental theory of

learning to read using alphabetic print.

Accepting this challenge and then dealing effectively with it will be no easy task. In order to account for the development of reading, we must demonstrate the sense in which reading is "there in the beginning" as a phylogenetically given feature of human nature that appears under a very wide range of genotype-phenotype interactions. At the same time, the form of activity that is the goal of reading instruction, the ability to read relatively complex texts and obtain useful information from them, manifestly does not emerge spontaneously in normal children and may not develop even with special fostering among children labelled "reading disabled." Rather reading of the kind that is the goal of school instruction is quintensentially a form of human activity that is cultural in nature. This form of activity was completely unknown to human beings 10,000 years ago, and is unknown to many millions of people alive today. It has come into being only under specific cultural-historical circumstances and except for extraordinary cases, it requires deliberate human cultivation for it to develop. Leaving aside the historical issues (see for example, Goody, 1977, 1987) we take it that our essential theoretical task is to show how it is possible to conceive of fully developed reading "being there" before children acquire it as a condition of its acquisition. Moreover, we must do so in a way that will then be practically useful both for organizing reading instruction and for dealing with the special problem of the reading disabled.

We begin this task by constructing a representation of the system we are seeking to create along side of already existing systems that create the essential conditions for development (Figure 3).

Insert Figure 3: Given and To Appear Mediations

Figure 3a represents the assumption that we make along with other reading researchers that children come to beginning reading with a prior ability to mediate interactions with the world by means of language, their background knowledge, and the people around them, in particular adults (C-A-W). (And of course, during socialization, as a matter of routine (Vygotsky, 1978), adults mediate the child's interactions with the world (Figure 3b: C-A-W). Next, we can assume that the adults who are present for purposes of instruction can read, that is we can assume the presence of the structure (A-T-W). These considerations specify two of the systems of mediation which are crucial resources for the beginning of the teaching-learning process for reading, which should bring into being the structure in Figure 3c, (C-T-W).

The systems in Figure 3 are not interacting. But in order for adults to be able to teach children how to read, they must interact in a specific way. At a general level, the challenge before us is to specify what it is that adults must do to induce children to adopt their interpretation of what it means to read. At an equally general level the answer is--create a medium of interaction, a reading lesson, that coordinates the child with the adult form of the activity.

Figure 4 sketches a juxtaposition of the systems that needs to be instantiated to create the constraints necessary for the mature act of reading to emerge.

Bereiter - can't do internalization - Answer to Fodor
Cog E doesn't answer learning paradox, according to Miller. (as pursued by Bereiter)
Fodor - Hirst - triggering & modules → neocultural theory of learning

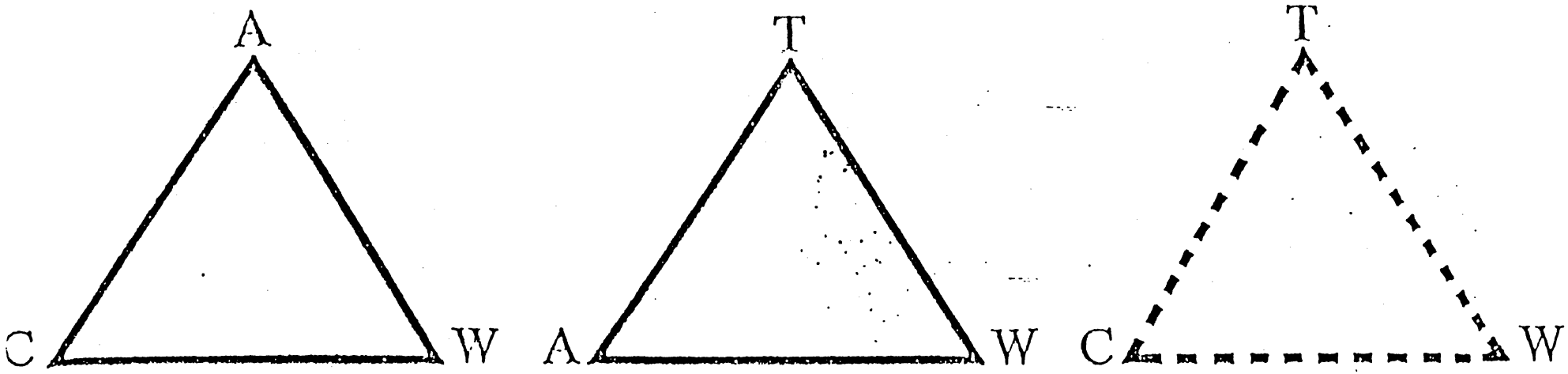
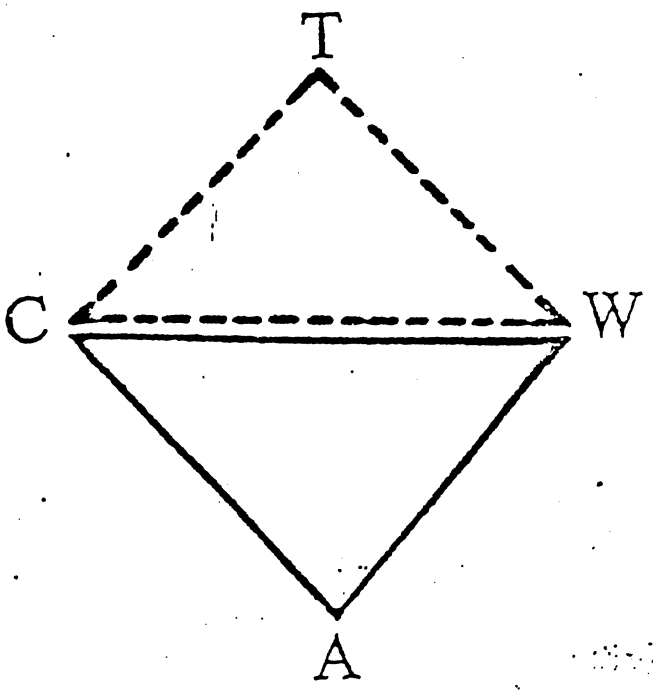


Figure 5: Given and to Appear Mediations

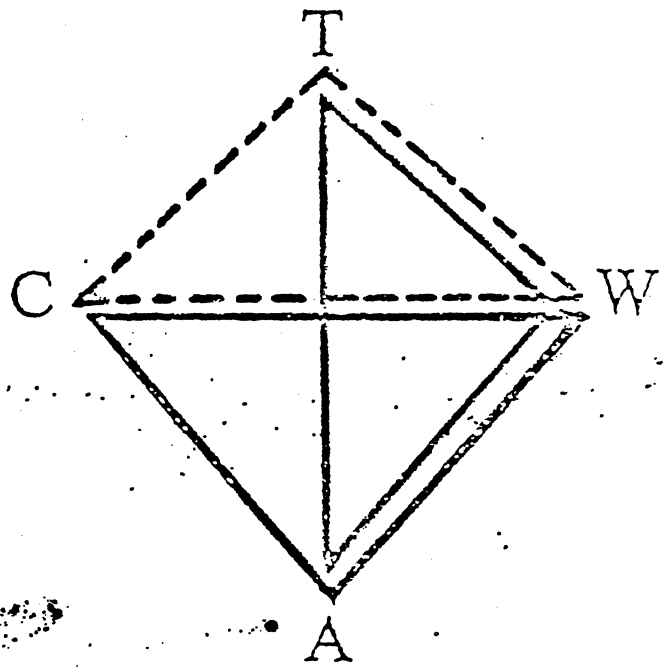
Insert Figure 4: Systems Juxtaposed

In Figure 4a the desired system of mediation indicating the child reading (Child-Text-World) is juxtaposed to the general socialization system (Adult-Child-World); that is, two systems of mediation, one including text, one including an adult are conjoined. However, as soon as this juxtaposition occurs, a third system (A - T - W) appears, as in Figure 4b, representing the adult as a reader of the text. If instantiated, the coordination of these three systems of mediation, two of them already existing, make it possible, at one and the same time, in the same activity, for the adult to mediate coordination with the child while he or she is being mediated by the text.

This structural model includes only a representation of the basic structural relations that we see as prerequisites for reading to be acquired. Even though one system does not include text (Figure 3b), it cannot be omitted. The young child's reading (the C-T-W triangle) is <u>not</u> equivalent to the adult's reading (A-T-W triangle), even though both are mediated by the same text. What they share is the basic mediated structure of the activity. At the very beginning of reading development, this will not be enough common structure to permit coordination around texts of any complexity, thereby rendering impossible the inter-personal functions of reading and, furthermore, blocking aquisition. It would be as if we juxtaposed only Figure 3b and Figure 3c, ignoring the special relationship between adults and children where adults serve as media for children's activities and development. For example, if the child is pretending to find his or her initials on the page and the adult is reading about a presidential election on the same page, the situation is not that much different from the situation represented by the three separate parts



6A



6B

FIGURE 6: SYSTEMS JUXTAPOSED

of Figure 3. There might be a joint activity going on but the "reading" of the child and the proficient reading of the adult are only contemporaneous, separate, activities.

Within our model, the differentiation between this form of interaction and the joint activity of reading is accomplished with the aid of the socialization triangle (A-C-W), where the presupposition of the adult standard holds. If the interaction of adult and child turns into a joint reading activity, new constraints are thereby introduced: the adult-child interaction serves to coordinate the otherwise disparate interactions with the text. Construction and interpretation of the text and coordination of the indirect and direct routes for interpreting the world can now rely on, and must now coordinate with, the adult standard. In effect, the addition of the Adult brings in two new triangles (C - A - W and A - T - W) which can be relied on to form alternate (indirect routes) for the child to reach the Text (C - A - T) or the World topicalized by the text (C - A - W). These additional indirect routes create the conditions for "performance before competence" (Cazden, 1981). They permit the child to enter into a system of reading before he can "really read."[4] The coordinating process which yields new representations (Figure 2) has more points of reference in a joint activity system. There are six "worlds" among which to coordinate and construct an "as if the same" relationship. Multiple representations of the world topicalized by the text provide many entry points for the child-learner's attempts to build a new

4. By naming the Adult-Child link, we do not mean to rule out child-peer interactions. Nor do we mean to imply that the expert and the novice roles cannot change microgenetically; that is, for one problem or one phase of a problem one participant may be the more capable, providing the required mediation, while for another problem or phase, the participants' roles might shift (cf. Inagaki and Hatano, 1986 for relevant description and argumentation).

representation; the face-to-face interaction with the adult provides a medium for negotiating the coordination that is more flexible than that provided by the author's writing alone.

In Figure 4 and those that follow, there are parallel lines which can serve as substitutes for the child's ability to make a crucial link and as elements in a monitoring or evaluation process constraining the child's exiting state (CW_{n+1}). The child-world link participates in the mediation through adults as well as in the mediation through text; The text-world link similarly participates in two mediational systems, one involving the child and the other involving the adult.

In sum, reading lessons, formal or informal, should involve a dual mediation for the child: constraints and potential for development arise both from interactions with the text and with the adult-teacher. Reading development consists of the emergence of new psychological structures more independently accessible to the child, such that adequate activity occurs (where "adequate" is defined by the adults' standards). [5] At first these structures are maintained in an inter-psychological, joint activity. If instruction is successful, eventually they appear intra-psychologically, i.e., in more independent activity where control has passed to the child. (See Vygotsky, 1978, for a discussion of the process of internalization we have in mind here.)

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5. The use of the word "accessible" here relates to Rozin's (1976) work on developing systems.

Section 3: From Theory to Methodology

Our theoretical analysis characterizes reading as a process of mediated knowledge expansion and leads to the conclusion that instruction of a specific kind promotes the development of reading. To be useful for present purposes, however, the means of achieving the proper coordination of existing mediational structures must simultaneously allow for differential diagnosis of children who are experiencing difficulties.

In short, what is needed is a form of reading activity that is both diagnostic and remedial. Moreover, we hoped to create our activity system in such a way that it would also be usable by ordinary classroom teachers. Needless to say, easier said than done!

The approach we developed in response to these converging demands draws upon several sources in cognitive, developmental psychology. The basic theoretical and methodological approach represents our understanding of the principles of development proposed by adherents of the social-historical school associated with the names of A.N. Leont'ev, A.R. Luria, L.S. Vygotsky, and their students. The specific method we adopted as a core of our reading activities is a generalization of the reciprocal teaching procedures developed by Palinscar and Brown (Brown and Palinscar, 1984; Palinscar, 1982).

A system of diagnosis: Luria's combined motor method

The system of psychodiagnosis developed by Alexander Luria several decades ago served as a model for the kind of interactions that would yield valid indicators of children's cognitive actions in the process of learning to read.

(Luria, 1932, 1979). It is fundamental to Luria's approach that human higher psychological functions such as reading cannot be explained by the mechanical combination of elementary processes however intricately they might be linked together by mechanisms of association:

> The structure of the organism presupposes not an accidental mosaic but a complex organization of separate systems...(which) unite as very definite parts (of) an integrated functional structure (Luria, 1932, p. 6-7).

Luria's specific interest was to discover a method whereby he could diagnose individuals' mental structures, their hidden thoughts. Believing that mental processes emerge from the interactions of system elements many of which are, in principle, unobservable, Luria formulated a method for making public the unobservable by putting it in interaction with another, observable, system for which he had a strong theory. The interaction of the two systems was expected to produce disorganization in the system for which Luria had a strong theory: the hidden system could be tracked <u>indirectly</u> by the publically observable disorganization. He stated the requirements as follows:

> We should on the one hand...produce the central process of the disorganization of behavior; on the other hand, we should try to reflect this process in some system accessible and suitable for examination. The motor function is such a systematic, objectively reflected structure of the neurodynamic processes concealed from immediate examination. And there lies before us the use of the motor function as a system of reflected structure of hidden psychological processes. Thus we proceed along the path which we call the combined motor method. (Luria, 1932, p. 18)

This is Luria's three step procedure for diagnosis: find one activity system with respect to which the psychologist and any subject can have a strong theory and standard publically observable behavior; then introduce a concurrent activity system which is the psychologist's main research interest

and whose organization is assumed to vary from individual to individual in ways ordinarily inaccessible to the psychologist; then analyze the disorganization of the first activity system to develop an analysis of the ordinarily hidden and very individual system.

The hidden structures that Luria wanted to investigate with this methodology are well described by Fodor's (1983, pp. 104-119) terms "Quinean" and "isotropic." Because of the intensely interactive nature of such systems, Fodor claims that they cannot be fruitfully studied by cognitive science. He argues the point based on the assumption that stripping down the phenomena is the only available methodology. Luria's methodology is one systematic way to challenge Fodor's claim; in essence his message is: Do not try to defeat the interaction, harness it for study. [6]

For the publically observable system, Luria chose an activity using a rather cumbersome dynamometer connected to a polygraph. The subject had to learn to keep one hand steady while he pressed a bulb with the other hand. When this activity was mastered, another one was combined with it: the subject had to respond with an appropriate verbal association whenever an experimenter said a word. The "hidden psychological processes" that Luria studied were of many kinds. In one version of the technique subjects were told several stories. One story was designated as "forbidden." The subjects were then told that under no circumstances should they let the experimenter know that they had heard the "forbidden" story. Among the words that the

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6. American linguists have had similar solutions. Note Bolinger: "Stripping syntactic samples down to their bare minimum creates vacuums which irrelevancies rush in to fill (1977, Preface)." Similarly, note the argument against the "clear case" methodology presented in Ross (1973) and the alternate conceptualization proposed by G. Lakoff (1974).

experimenter presented to the subject were "key" words related to the "forbidden" story. Luria found evidence that could be related to the "forbidden" story in the disruption of the bulb-pressing and the disruption of the hand that was supposed to be held steady, as well as in the more traditional measures of verbal responses.

Luria demonstrates that the disruption of the systems involving the motor activities (each hand's task and the motor aspects of the speech) provide for an analysis of the hidden psychological structures that account for word-association performance. When the steady hand wavered unusually or the bulb pressing hand was delayed or otherwise disrupted, Luria could claim that the structure of the hidden representation could be recovered because the combination of the voluntary public behavior and the structure of knowledge from past experience

> connected with each other so closely that they are set in motion by two simultaneously occurring actions in one and the same process. (Luria, 1932, p. 23)

Luria says that the combined motor method is a <u>model system</u> and he was very clear about the implications of that term.

> The ideal for the psychological experimenter has become the possibility to reconstruct artificially the phenomenon under examination, because only this allows one to keep it entirely under control. The psychologist's ideal became a method by which it would be possible to produce in a laboratory a model of the phenomenon analyzed. (p. 129)

Given that the experimenter could gain access to the hidden system for purposes of research and diagnosis, the question arises, how can the subject gain control? In Luria's work, <u>remediation</u> was an important test of the theory as well as an important practical activity. He examined cases where

"elementary processes" were impaired or not yet developed to an adult stage and found that "functional systems" could be engineered to overcome impairments or increase a child's performance level. He rejected both idealist conceptions that depended on the direct application of "will power" and mechanistic conceptions that predicted an accidental mosaic of elementary behavior units. Instead, his analysis of how processes are united in functional systems emphasized the importance of artifacts and mediation in the process of change:

> ...the consideration that a voluntary act can be accomplished by `will power' is a myth...the human cannot by direct force control his behavior anymore than `a shadow can carry stones'... Voluntary behavior is the ability to create stimuli and to subordinate them; or in other words to bring into being stimuli of a special order, directed to the organization of behavior." (p. 401)

Luria demonstrated his remedial techniques with patients afflicted by Parkinson's disease. The patients were unable to press the dynamometer bulb very strongly, or very often. Luria first suggested that they count the individual presses while they were pressing. This had no effect; in fact, it was just as difficult for them to count as it was for them to press the bulb. Then Luria told them to do two things at once, count to a specified number (8) and press the bulb. These two systems, interacting only in time (the subjects were not counting the bulb presses), served to organize each other and produce much less impaired performance: the subjects pressed the bulb more strongly and more often and they counted more fluently. The solution was one of indirection, the mediation by a well developed cultural object (counting), not applied by "will power" but nonetheless available to organize the "simpler" system of bulb pressing.

In Man With a Shattered World, Luria (1971) provides a longitudinal study of remediation of reading and writing by indirection. Zasetsky, the patient, had severe difficulties when reading and writing following extensive brain damage. His direct attempts to re-learn reading consistently failed. The literacy system could only re-emerge indirectly. In teaching Zasetsky to read, for example, Luria and Zasetsky developed the patient's proficiency at using a set of highly salient images to associate with each letter of the alphabet but when this device failed him (which it did with many letters on many occasions), he simply stopped trying and started on another task, viz., reciting the alphabet. However, his recitation would be disrupted just as he reached the letter he had been trying before to identify; thus he could, and did, return to his initial task of reading the difficult word. The system for recognizing a letter and the recitation of the alphabet interacted and the subject's "hidden task" disrupted the alphabet recitation in exactly a way that the subject could control and harness for his use.

The program of remediation that Luria and Zasetsky entered into had a definite advantage from the start: Zasetsky knew what reading was, knew that he wanted to do it, and could verbalize the specific deficits. In short, he understood the well defined aspects of the task -- the goal and the constraints. Remediation consisted in helping him reorganize elements of a prior system that had been disrupted.

The predicament that we found ourselves in with our learning disabled children was qualitatively different: they had no history with independent successful reading and we had no way of knowing whether their notion of the goal and the constraints had any coherence with ours.

Leont'ev and the problem of motivating development

Luria's statements about voluntary acts and voluntary behavior are a partial guide to creating the necessary conditions for a model system of diagnosis and remediation. But they do not solve a crucial problem in the study of learning disabled children. How is it possible to motivate them to enter our system voluntarily? We, like classroom teachers, had to focus on how to get children to be appropriately engaged, a topic addressed by A. N. Leont'ev (1981).

After affirming the importance of indirect structures for organizing mental activity, Leont'ev addresses the issue of the origins of voluntary activity:

> ...the indirect structure of the mental process is originally moulded in conditions in which the intermediate link has the form of an external stimulus... The new structure...does not arise from within and is not invented, but is necessarily formed in intercourse, which is always mediated in man. Thus, for example, the voluntary "triggering of an action" is originally mediated by an external signal, by means of which another person affects the behavior of the subject performing the action. At this stage of its formation the indirect structure characterizes the corresponding 'interpsychological' process, i.e., the process as a whole in which both the person giving the signal and the one reacting to it by performing the action participate, rather than the process accomplished by the active subject himself. Only afterward, when the triggering signal begins to be produced in a similar situation by the acting subject himself does the now "intrapsychological" process (i.e., one wholly performable by a single person) acquire an indirect nature: the elementary structure of a voluntary, volitional act has been created. (Leont'ev, 1981, p. 282)

Following Leont'ev's formulation, we sought to create the two necessary conditions for the genesis of a voluntary activity.

1. The children had to have available some motive that they could eventually call on to organize (to motivate) the most advanced behaviors that we wanted them to develop. (Leont'ev expected

that at first the motive would lack organizational power; in fact it could be described as "lip-service" to the adult's goals.)

2. The children had to be engaged in the component parts of the activity, even if, at first, the basis of their involvement is coincidental (or irrelevant) to the system as seen by the adults. (Leont'ev expected that the early "conditional" nature of the activity would undergo a transformation if the outcome of the activity was more valuable than could be expected, given the children's original basis for involvement.)

As the activity evolves into a voluntary activity, Leont'ev notes that there are two transitions:

1. The role of the others will decrease; the children will anticipate and presuppose the activity's components. (External stimulation is replaced by auto-stimulation.)

2. As the activity changes from conditional to voluntary, and as the "lip service" motive gains power to organize behaviors, the children will perform acts that would be analyzed as incoherent or irrelevant as judged from the point of view of their original motives for participating.

Taken together, Luria and Leont'ev urge on us a strategy which links our rather abstract characterization of the structure of reading activity in Figures 1-4, and our equally abstract characterization of the way in which given and to-be-created systems of mediation need to be coordinated, with concrete activity settings and means for making theoretically relevant observations. From Luria we take the idea of selective discoordination in an activity that is voluntary and in some sense shared between people. From Leont'ev we take a theory of how to affect the transformation of involuntary into voluntary activity in the processes of instruction.

Question Asking Reading: An instantiation of a model system

The work of Vygotsky, Luria and Leont'ev, provides a theoretical basis for developing an activity system that simultaneously embodies a mature system of reading comprehension supports the developing reading systems of the individual children, and makes the developing systems amenable to diagnosis and re-mediation. But they do not specify, in particular, how reading can be organized to accomplish these goals. In order to connect these ideas up with a concrete reading curriculum, we modified general procedures developed by Brown, Palincsar, and their colleagues.

A generalization of Palincsar and Brown. At the time that we began this research, Ann Brown and Joe Campione were members of the research team, so it was only to be expected that we would learn about the work going on at Ilinois in the development of a reciprocal teaching procedure (Brown and Palincsar, 1982). As described in Palincsar and Brown (1984), their investigation of remedial reading at that point involved a two person tutorial procedure for teaching comprehension to 7th graders, concentrating on the analysis of the main idea of text by getting the youngsters to engage in a reciprocal questioning dialogue.

The basic strategy requires the teacher and pupil to read silently a segment of text and then to discuss the text, taking turns performing four tasks:

1) summarizing the text,

2) clarifying any comprehension problems that arise,

3) asking a question about the main idea,

4) predicting the next part of the text.

In a recent publication, Brown and Palincsar (in press) summarize their conception of reciprocal teaching in terms that indicate just how close their current conception is to the requirements that we have specified for diagnosis and remediation within a strong system of instruction:

> As currently practiced, reciprocal teaching is a form of guided cooperative learning featuring: a collaborative learning environment of learning leaders and listeners; expert scaffolding by and adult teacher; and direct instruction, modelling, and practice in the use of four simple strategies that serve to prop up an emergent dialogue structure (in press, p 63).

Although at the time we began this research reciprocal teaching had only been used in one-to-one lessons, we were all pretty certain that the procedure could be adapted for small group lessons, which subsequent research has verified (see Brown and Palincsar, in press, for a review of their research program and its relationship to ongoing research on reading instruction). Acting on this assumption, we organized reading instruction as a small group activity. However, since we were dealing with children in grades 2 through 6, many of whom were not "adequate decoder," we anticipated a great deal of difficulty in coming up with a method that would embody a cooperative "learning environment of learning leaders and listeners," a medium for "direct instruction, modelling, and practice" in the use of effective comprehension strategies.

Procedures for Question Asking Reading

As a first step (at what we might called the "script" level) we converted Palincsar and Brown's two person dialogue into a multiperson "play about reading." The skeleton of the procedure is a set of roles (each corresponding to a different hypothetical part of the whole act of reading) and a set of role

cards printed on 3" x 5" index cards. Each participant was responsible for fulfilling at least one role in the full activity of "Question-Asking-Reading." These cards specified the following roles:

- The person who asks about words that are hard to say.
- The person who asks about words whose meanings are hard to figure out.
- The person who picks the person to answer the questions asked by others.
- The person who asks about the main idea.
- The person who asks about what is going to happen next.

All participants including the instructor had a copy of the text to be read, paper and pencil to jot down words, phrases or notes (so they could be ready to ask or answer the questions implicit in the roles), and a card to remind them of the role to play. This procedural script was embedded in a more complex activity structure designed to make salient both the short term and long term goals of reading, and to provide coordination around the script.

It is in this embedding process that we make the transition from a focus on the structural model of the reading process depicted in Figures 1-4 (which we henceforth presuppose) to a focus transformation in the affective quality and cognitive structure of the child's interactions with print.

Instantiating the Question-Asking-Reading Procedure

The children we worked with in the first study reported here were deliberately chosen to represent the general population of poor readers that teachers encounter in their everyday classroom experience. A total of 35 children participated in the program, which we called Field Growing Up College

(see Appendix for description of the children in general demographic and standard psychodiagnostic terms). The children ranged from the 2-6th grade with a preponderance of 3-5th graders. They, were, by and large, children who were struggling in school for one reason on another. Virtually all displayed a clear distaste for any activity that smacked of school, unless it was artwork or unsupervised playground activities. Hence, we could assume that they would not be predisposed to find Question Asking Reading fit competition for a myriad of alternative possibilities in the community, ranging from soccer and piano lessons, to unsupervised hanging out with one's friends. The challenge in attempting to instantiate our model system, then, was to make the activities attractive enough for the children for them to participate in them sufficiently to allow us to specify meaningful discoordinations (for a fuller description of the overall context of Field College see LCHC, 1982).

We knew that the script and roles, by themselves, would not be sufficiently attractive to evoke spontaneous group reading. And we knew that we would fail if we imposed the activity upon the children too powerfully. Even if we succeeded in externally stimulating the children to participate in the scripted reading activity, and succeeded in getting them to take over the control, we still might fail to "promote" the transition of scripted reading as the voluntary activity.

Recognizing the need to make the environment rich in goals that could be resources for organizing the transition to reading as a voluntary activity, we saturated the environment with talk and activities about growing-up and the role of reading in a grown-up's life. As a part of their application to participate in Field College, of which Question Asking Reading was a major

activity, the children filled out applications that emphasized the relationship between reading and growing up. They got involved with us in discussions about the difference between getting older and growing up; about how our activities were related to their goal of growing up; and how, in general, activities with us were serving their goal of growing up (or if they were not, something was wrong and would have to to be changed). When it could be arranged, the children undertook grown-up responsibilities that require reading in many circumstances: earning money, preparing programs for outsiders, choosing and buying supplies, corresponding with adults by mail, planning and implementing changes in the College. The texts that the children read as part of Question Asking Reading were about growing-up and/or about topics that were as interesting and valuable to grown-ups as they were to children.

We make no claim that each and every child always had independent access to motivation based on our analysis of their grown-up life and its demands; nor do we make any claim about how to specify their understanding of the motives for participating. We claim only that these motives were a public convention that occurred and re-occurred in our interactions and that the children and adults could act in a cohesive, coordinated way with respect to this convention.

Engagement in components. We worked very hard to question and be flexible about which acts were to be "have to's" and which were to be considered "get to's." We arranged for the children to "have to" choose what to have for snack; sometimes they "had to" run the video equipment that adults ordinarily used for data collection; sometimes they "had to" go out and play; sometimes they didn't "get to" go to reading. If we failed to work the activities

around to a voluntary activity that the children "got to do," we always made it clear that the children could go elsewhere: "Sure you can go. What do you mean you 'have to read'? Nobody has to be here."

As a result of this strategy, we have pieces of video-tape where the children are asking to read, or to read some more, or bitterly complaining that they didn't get to read or read enough. These incidents were important as publically shared history that could be used to maintain the rather shaky norm that we needed to have: reading is something children want to do and will choose to do.

Conditions of the reading activity were organized to facilitate the children's adoption of the system:

1. The children did not have to be independent Poor Readers. There was no mystery about what was meant by reading: it was the publically observable "script" that was played out for an hour each session. The children learned early that they could participate effectively, getting as much help as they happened to want or need.

2. Children could define reading as some piece of the public script activity and different children could define it differently. At some time for some children, going to reading meant a chance to collect lots of pieces of paper; at other times it meant a chance to underline words with a red pen; at other times it meant a chance to write on the blackboard; at other times it meant a chance to find out what happened to the policeman who was shot by a teenager, or to the young man who was in trouble for running away and living at the Los Angeles airport or what laws have to be followed for a teenager to be able to work.

3. The children had some power over which reading group they were in. We did not have <u>a priori</u> age or grade criteria for group assignment, and so we could arrange for children to be with (or away from) siblings or age or ability mates pretty much on their demand.

For many children, the most effective motive for participating in reading group was a Big Sibling, the UCSD undergraduates who worked with the children inside and outside of Field Growing Up College. Very often, reading group was a special time because it was a good time with a very pleasant young adult. For some children reading became a "get to" as an ancillary part of the "getting to" be with a Big Sister or Brother. Although the Big Siblings were not always there, participation in reading group was a strong connection between the sibling pairs. The children and the undergraduates were both our students; they could talk about the advantages and disadvantages of their student roles. They could talk about why they bothered to be students and whether what they wanted to do with their life had any relation to what they did in class that day at the university or in reading group that day at Field Growing Up College.

Much of our apparatus could be described as entrapment or seduction. We are not ashamed to plead guilty to such charges; as long as the children were at reading group with some self-selection, we were content. We view the different parts of this overall apparatus as elements in the model system. As an ensemble, they constitute the system of external stimulations which the children could take over so that they could become auto- stimulations.

Evidence for this claim lies in the children's arriving at reading group "without being told," their anticipation of what materials and people were needed to start the reading groups, their anticipation of the sequence of activities, their notice of any changes in the routine as breaches in the expectation, their suggestions about changes in the routines; in short, their coordination with the adults' presuppositions about the activity.

Again, we do not claim that for each and every child at all times the really effective motives were "auto-stimulations" or even that the motives were always really effective. Sometimes, the scripted activity, the publically observable reading event, broke down. Even our tricks could fail. But our method assumed that this would happen: it was only crucial that the discoordinations were not fully random. Examining the disruption is the way to reveal the "hidden system" of reading disability that is the object of study. When "all the king's horses and all the king's men couldn't put" the scripted activity or some part of it together again, we had a chance to see our particular Humpty-dumpty.

The play of Question Asking Reading. At the start of the hour, the children and adults were divided into two groups, led by a teacher/researcher. The group sizes varied from three to six or seven depending on how many children and university students were present. [7]

The session for each group began with a discussion of "why do Question-Asking-Reading." The main goals to be discussed were usually written on a blackboard or easel. Four different goals, each stressing the instrumentality of reading, were included in these opening discussions.

1. Grownups are often required to read. Children work at reading so they can succeed as grownups. As a more immediate goal,

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7. The minimum number of competent adult readers was two, regardless of the number of children present. Because the children's discoordination with reading activities was sometimes extreme enough to endanger the script's implementation, we needed at least one asker and one answerer to mediate the interaction with the print in the prescribed way to insure maintenance of the model system. When adult or child visitors dropped in, they were treated like any other group members and the children were instructed to help them with procedures. Besides the authors, Mary McGinnis served as group leader.

children could graduate from reading group and become assistants to the mythical wizard in charge of computer-based activities, if they could do well on reading tests as grown-up assistants were expected to.

2. A second goal of reading (and a way to succeed at reading) is to be able to pose important questions about things that are written down and to answer important questions.

3. A third, somewhat more immediate goal was to come up with good questions[8] for the test that was going to come immediately after the group reading session.

4. A fourth goal was both present and distant -- the opportunity to graduate from Question Asking Reading to a junior counselor role in Field College, where prestige and various attractive activities could be expected.

Discussions of reading goals often began informally while children were having a snack and continued until the leader felt that the basic points had gotten into the conversation one way or another. A lot of conversational work went into getting the children to talk about "why read" in a genuine way.

Work with the text began with a group discussion of the title or headline of the story to be read that day. Then, following the QAR script outline written on the blackboard, the role-bearing cards and the first paragraph of the text were passed around. A good deal discussion usually ensued about who had gotten what roles; "pick the answerer" was an obvious favorite, and the children tried to avoid the card implicating the main idea in the discussion. Texts were taken from recent newspaper articles selected for their potential

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8. We defined good questions as ones that either (1) you answered correctly and that helped you to remember the most important things about what you had read; or (2) you could not answer but by reading the text again you could figure it out and get it straight.

interest value to the children. [9] The group read the paragraph silently, making notes as needed, before they performed the tasks designated on the role cards and made up a good question. Then a second paragraph and new role cards were distributed and the activity went through another round.

The newspaper stories were modified to make it possible for the two groups of children to read one paragraph in common and one different paragraph, yet retain continuity. One group read the first and second paragraph of the story, for example, while the other group worked on the first and third paragraphs. This arrangement allowed us to confront the children with several kinds of questions:

1. Questions about the two paragraphs they had read in the group.
2. Questions about the paragraph the children had not seen before.
3. Questions the children had made up themselves.
4. Questions made up by the children in the other group.
5. Questions prepared ahead of time by the researchers to insure a variety of question types.

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After the two separate groups of children had completed work on their two paragraphs, they were sent outside to "shake it off," while the adults quickly added the children's questions to the quiz papers. The children and adults

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9. We subscribed to the neighborhood paper but also used stories from a nearby large metropolitan daily. The genres of the texts used varied, some being more narrative some more expository. Topics ranged from SWAT teams to new medical technologies; from a child critically injured while imitating a TV show to a dog whose strange stomach xrays had a comic outcome. Occasionally, we had a series of stories on a topic, following news breaks or in-depth further coverage by the newspapers. We restructured some paragraphs and reworded some sentences, but we followed no readability formula; unusual vocabulary was sometimes explained in the text, otherwise there was no effort to adjust or control the vocabulary.

then pushed the two separated tables together to form a single test-taking table. The quiz and the complete three paragraph text was handed out and the children read and wrote answers.

The final scripted activity was a critical discussion of the test questions and answers. Since several different questions focused on each paragraph, we treated the questions from a "test-consumer comparative shopping" point of view. The children were encouraged to discuss not only whether an answer was correct or whether a question was fair but also whether the question was good, the kind that helped a grown-up reader. It was not always possible to keep children's interest for these analytic sessions (the end of the day or the time for going to the next activity beckoned) but it was sometimes possible to observe heated discussions as the children confronted the lack of relationship between a correct answer and a good or fair question.

Overall, these arrangements created conditions where encounters with reading were constantly embedded within a public activity organized around the meaning of an entire text. We were under no illusions that the children would "get it" the first time through a passage. Rather, we conceived of the overall activity as a structured medium that would promote multiple confrontation with text and multiple confrontations with each other's interpretations, e.g. the conditions that promote development.

Section 4: The diagnostic and remedial results of using The Model System

We sought to evaluate the success of our model system in various ways.

Standardize reading scores

At the most molar level, we attempted to obtain reliable evidence on the children's progress on the CTBS which the school planned to administer at the beginning and end of the school year. This effort was somewhat undermined by the fact that the children were not, in fact, given alternative forms of the same test, but different levels of the CTBS, the spring test being the more advanced. In addition, some of the children were exempted from the tests in either the fall or spring because of language or learning difficulties.

Despite massive ambiguities inherent in the resulting pool of scores it appears that the children who participated in the system showed modest gains in both their reading scores and their classroom behavior, taken as a whole. The pattern of performance changes was in fact quite heterogeneous.

Even had we better scores, analysis of the data at this level could neither satisfy our desire for knowing about the overall effectiveness of the system, nor provide diagnostic data about individual children. It would fail to provide evidence about the effectiveness of the system because we had no properly established control group. It would fail to provide evidence about the processes giving rise to the performance, the very reason we sought a method of in situ analysis in the first place.

We do not propose to solve the former problem with the data provided in this section of the paper. In a later section we will describe briefly an experiment by King (1988) which employed a more standard experimental methodology and which showed Question Asking Reading to be an effective teaching

procedure. Instead, we will attempt to demonstrate the way in which Question Asking Reading can function as a fine-tuned diagnostic system, and make visible the process of learning and development posited by our theory of reading and its acquisition.

In Situ Diagnosis and Remediation

To provide a sharp sense of the kind of data made available for analysis by our procedures we will present the transcript of a reading session starring two boys, Armandito and Billy. Transcripts are difficult to read. However, short of a live presentation or a videotape, they remain, when supplemented by description of the context, our best vehicle for describing the interactions which are the focus of our concern. In order to interpret the children's performance, the reader would do well to read through the following text and ask of each paragraph, "what's the main idea?", "What is a word that is hard to say?", which, along with the other role cards are key elements in the publically available resources for coordinating around the activity of reading.

Frozen Window Into Past

A discovery in Alaska has given scientists a picture of what life was like for Eskimos hundreds of years ago. The underground home of an Eskimo family was found under the city of Barrow, on the Arctic Ocean in northern Alaska. The remains of the family were found, too. Two bodies were so well preserved that someone sent for the coroner, thinking that they had died recently. Skeletons of three children were also found. Clothing and tools were found in the home, giving clues about daily life. "It is a moment frozen in time," said Raymond Newell, an anthropologist who worked on the project. "We can reconstruct what the life was like."

The Eskimos lived in an area where winter temperatures reach 100 degrees below zero. They dug long tunnels into the ground to make homes that would keep the cold out and their warmth in. During the spring thaw, the tunnels filled with water and families packed their belongings and left. This family must have died during a winter storm, when ice trapped them and crushed their home. But the ice preserved their bodies

like Egyptian mummies are preserved. Found with the family were their clothing, waterproof boots, trousers and mittens made of polar bear skin. Also found were the tools the family used, including hunting bows, snow goggles, sewing equipment, ladles, wooden buckets, and ceramic pots.

Michael Zimmerman studied the bodies very carefully. He worked on Egyptian mummies, learning about how people lived long ago. He said the thing that is really striking is not the differences but the similarities between ancient and modern people. The lungs of the women were filled with black soot from the oil lamps they used. They looked like the lungs of modern day smokers or people who live in dirty cities. The autopsies also revealed evidence of a disease called trichinosis, probably the result of eating undercooked polar bear meat.

As an illustration of the diagnostic potential of the question-asking-reading procedure, we will work through parts of one reading round with Armandito and Billy based on this text. The data we offer is a transcript from the videotaped discourse. We will work through three portions of the session: the first provides evidence about the way that the children enter the task at the outset; the second displays the joint construction of interpretations of the main idea and a question; and the third throws light on the problem of diagnosing comprehension skills on the basis of reading tests.

On the occasion we describe the two boys are reading about the "Frozen Window Into Past" with Katie as the group leader and Larry, an undergraduate and favorite older sibling for many of the children, as a fourth group member. The first requirement in the analysis is to demonstrate that we succeeded in instantiating the voluntary system that permits diagnosis of children's functional systems for reading.

Question-Asking-Reading as Voluntary Activity

Our evidence for the existence of the voluntary system is analogous to the evidence offered by Luria using the combined motor method. In his case the subject had to coordinate the motor tasks of holding one hand still while pressing a bulb with another and saying a word. In our case the children and adults must be coordinated with the steps of the procedures for Question-Asking-Reading and the roles specified on their cards. In our case, as in Luria's, strategically located discoordination of the activity is a key indicator of the subject's hidden understanding.

Two indices of the existence of a coordinated voluntary system are available to us by virtue of the structure of the scripted activity we set up. First, we can use evidence from the participants' talk that the voluntary task is being presupposed by participants. Second, we can use evidence that subjects anticipate next steps in the procedure. Both presupposition (indexing the operation of a shared past history between participants) and anticipation (indexing a shared future) are central to the coordination of action (Bernstein, 1966; cf. Griffin and Cole, 1984 for further discussion of the importance of Bernstein for understanding the work of Luria, Vygotsky and Leont'ev). Hence we can use their presence or absence in conjunction with the public structure of the reading task to warrant statements about the hidden psychological process of reading.

We pick up the action after the children have completed one paragraph and have come up with a question to ask on the quiz. The script calls for the group to go on to the next paragraph, distribute the role cards, take the text, and read it. The paragraph is the third one in the text given on p.00

above.

Getting started

Katie, the group leader, has been at the easel that the group uses in the place of a blackboard. She finishes writing the question that the group made up for the first paragraph they had read together, and returns to her seat.

(1) Billy: (Points at the other group) Why do they always get the chalkboard?

(2) Katie: Maybe you guys can sit over there.

(3) Billy: No. Next time I'm going to take the chalkboard over here.

Here we encounter the first kind of evidence we need to claim that a child is coordinating with the task: Billy refers to what is always done in reading (1) and makes public what he intends to do the next time (3). Both statements presuppose his participation in the procedures (while asserting his own plans for arranging the agreed-upon future). Armandito's status is unclear. He is there, but says nothing. He is drawing on a pad of paper. Katie then sets the context for the subsequent parts of the procedure by summarizing what had been said about the main idea of the previous paragraph.

(4) Katie: So, the reason it was really interesting is because they found people preserved from hundreds of years ago and they had their clothes and their tools with them, so we can see how they lived. OK, lets go on to the second paragraph then.

(5) Billy: How did they find them?

(6) Armandito: The Eskimos.

(7) Katie: I think it was an accident (as she says this, she begins to pass out the role cards, face down).

(8) Billy: (Taking a card from the stack) How come, what kind of an accident?

(9) Billy: (Looking at his card) That's the same card again.

Once again, Billy is providing evidence of his participation in the activity system. He asks a question (5) that may be interpreted as an internalization of the "what's going to happen next" role in the script, an instance of the "auto-stimulation" of a reading-related act that on other occasions is stimulated by an adult using the official script. He takes the card handed to him, asks a question relevant to the story being read (8), and comments on the relationship between his role for the previous paragraph and the one he is about to enter (9).

Armandito's participation is still problematic. His comment, "The Eskimos" (6), refers to the topic, but it is not at all clear how the comment makes reference. In the next segment, Armandito's participation will be more clearly problematic. Although Billy took the card as it was handed to him, Armandito does not. He is bent over his drawing, a picture of an underground chamber with a long tunnel leading down to it. Katie gets his attention:

(10) Katie: Armandito! (He looks up and takes a card.)

(11) Billy: We each get another one (referring to the cards).

(12) Katie: Yeah. You want another one?

Armandito's participation requires a discoordination in the flow of the activity. He is there, but not coordinated with Question-Asking-Reading.

Once again Billy (11) provided evidence that he was participating in (and coordinating in terms of) the activity. There are five role cards and only four participants; someone will need to take a second card. (Billy's math or expression of it may be weak, but he again shows self-control about the scripted activity.) Katie builds directly on Billy's observation to amplify his participation. He takes the extra card when it is handed to him. She then hands a card to Larry, the undergraduate, and keeps one for herself. Armandito looks over at Larry's card. The sequence that follows once again renders problematic the nature of Armandito's participation in the activity.

(13) Armandito: (Reading from Larry's card) Oh! Pick the Answerer! No...I was going to pick the answerer on this one.

(14) Billy: Too bad.

(15) Larry: No trades, no trades man.

(16) Armandito: I gotta go. (Saying this he bends down and draws in a more concentrated fashion.)

(17) Larry: You don't gotta go anywhere.

(18) Katie: Oh, we only have three copies of the story.

(19) Larry: I'll share with Armandito (moves around to sit next to Armandito at the table).

(20) Armandito: Some days I'm not even supposed to be here.

Here it would appear on the surface that Armandito is firmly rejecting the task of reading, even to the point of declaring that he is going to leave (16). All children knew that they had the right to leave, so long as we could be sure that they were supervised for the time span we had promised their parents we would be responsible. That was a central rule of Field College which required no justification. But as additional justification for his right to leave, he declares that on some days he is "not even supposed to be

here" (20). He is correct. The children each came officially for two sessions a week. But in the role of a guest of someone else, they were free to come more often. Armandito came often, in excess, if not in violation, of the rules of Field College. if he was there in a student role or a guest role.

Armandito's "leaving behavior," despite the verbal justification, is accompanied by a good deal of "staying behavior." First, as he says "on this one" (13) he communicates his involvement in the ongoing history of the scripted activity. Second, he does not make a physical move to go anywhere else. Third, he is drawing what will turn out to be topically relevant -- Eskimos in a cave. In general, he is presupposing the normative order of being at Field College, if not at Question Asking Reading.

This half in-half out position is not adequate for purposes of instantiating the model system, so Larry and Katie attempt to change the interaction in order to create the coordination they need. Katie ignores Armandito's remarks, continuing the official public activity (18). Larry puts himself in a position to resolve the problem of Armandito's discoordination by using the organizational problems posed by Katie (not enough copies of the reading) Sharing the task with Armandito requires that Armandito be present (19).

Now sharing Armandito's activity, Larry attempts an abrupt change from drawing to reading:

(21) Larry: (Lifting the drawing from Armandito's hands) You can do that later.

(22) Armandito: (Taking the drawing back) Wait!

(23) Katie: Just let him finish that, it's pretty cute.

(24) Larry: That's a nice Eskimo.

(25) Armandito: I know it is.

(26) Katie: What kind of fur is that?

(27) Armandito: Dog fur.

(28) Billy: Caribou.

(29) Katie: (To Billy) Yeah, caribou. (To Armandito) Good Job.

(30) Larry: Good job (he lifts the picture out of Armandito's hands. Armandito allows it to be taken. Katie gives him the paragraph to read. This time he takes it).

(31) Billy: Michael what's his name? (Looking at passage which begins, "Michael Zimmerman.")

(32) Katie: Zimmerman.

(33) Billy: That's a hard word to figure out (starts to jot it down).

This segment begins with Larry attempting to compel Armandito to participate by taking away his prop for remaining at the table in talk about Eskimos without doing any reading. Katie, in her role as group leader, instead organizes the talk around Armandito's activity (26). [1] Note that Armandito, by telling Larry, "Wait," is presupposing a time when the waiting will be over and he will participate. When the time comes (30), Larry, Katie and Armandito are all involved in the transaction that substitutes the reading for the drawing. After a little talk about the picture, Armandito accepted the next passage to read.

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1. We can also note Katie's selection of Billy's name for the kind of fur Armandito was drawing (29). Presumably caribou fur is considered more topically relevant than dog fur. Armandito is experiencing difficulty sustaining the legitimacy of his right to interpret the products of his activity relative to Billy.

Billy does more. Without prompting (31) he does the scripted next step. He looks at the text and coordinates it with his role, to write down different words that he will later ask questions about. This little segment (31-33) is so casual and natural that it is easy to miss its import; it is a little microcosm of a model system working perfectly. In Luria's words, there are two processes so closely related that they are simultaneously set in motion: Billy is figuring out a word in order to go on with his silent reading of the paragraph and, at the same time, he is getting a word to use as a part of his role in a subsequent part of the scripted reading activity.

The rest of the group coordinates with the presupposition that the model system is working and Question-Asking-Reading starts up again. Four heads are bowed over the copies of the paragraphs, an occasional short question and answer exchange is muttered, an occasional note is taken: it looks like a study group of over-achievers.

Getting the Main Idea

Once coordination around the script starts to take shape, it is possible to get a detailed idea of the children's difficulties interpreting the text.

(34 repeated) Larry: Armandito. What's the main idea?

(35) Armandito: I want to ask mine. I want to ask what happens next.

(36) Larry: No. I know what you want, but I'm asking. I pick the answerer.

Armandito is quite explicit about his preferences. He wants to fill the role on his card. His proposed change for the scripted sequence would avoid the crucially troublesome script element. In spite of this limited orientation to the main idea that his "hidden" reading process promotes, he still gives

evidence of anticipating the scripted reading activity and verifying his voluntary participation in Question-Asking-Reading.

This example typifies the children's behavior with respect to the main idea card. While the children will work piecemeal through the text picking out individual words, they strongly resist the activity of comprehending the passage as a whole. This example also illustrates the intransigent problem facing researchers and teachers: if the child fails to accept the main idea question part of the task as expected, then no reasonable interpretation of his subsequent behavior can be made to provide evidence of his success or failure relevant to that task. Because the "child-task" we might call "reject-avoid what the adult is trying to interest you in" holds a good deal of attraction for these children, the remedial system of Question Asking Reading needs a good deal of power to insure support for an effective way to remediate the children's understandings. It is only when the children are involved in the co-production of the main-idea-question that their "hidden" understanding of reading with respect to main ideas (comprehension) can be diagnosed.

Once the question part of the task is firmly on the table, the group turns to a production of the solution phase. Here is how the work proceeded right after Larry (36) stated and maintained the normative ordering of the scripted activity, opening the floor for Armandito's turn to answer:

(37) Armandito: The main idea is (pause) how these guys live.

(38) Larry: No, the main idea of the last paragraph was about that.

[There is a distraction as Katie gets another large pad of paper for writing on at the easel.]

(39) Larry: What do you think the main idea of this last paragraph was? The one we just read about Zimmerman?

(40) Armandito: How should I know?

It would be difficult to imagine a more straightforward acceptance of the task or a more honest (and pathetic) answer. Armandito (37) provided one answer, but it did not show specific mediation of the written text currently being considered. He imported information from prior context. Larry points this out (38), and Armandito displays his problem.

Next, Larry tries a question that brings out some words from the relevant paragraph:

(41) Larry: Who discovered mummies from way back and talked about similarities between mummies and Eskimos?

Instead of answering this question, Armandito launches into a litany of the internal organs of the body including the liver, the heart the intestines and the lungs.[2] The only link discernible between his talk and the content of the paragraph is the mention of lungs. Larry hangs on to the paragraph-related topic:

(42) Larry: So what did this guy find out?

(43) Armandito: That the mummies were Egyptian.

(44) Katie: What did he find out about the Eskimos who lived there?

(45) Armandito: They were scarey.

(46) Katie: What about the trichinosis?

(47) Billy: (Reading aloud) Probably the result of eating uncooked polar bear meat.

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2. We later discovered that many of the items he lists were part of an anatomy lesson in school that morning.

(48) Katie: What about it?

(49) Armandito: (To Larry) I'm going to hit you...so hard you are going to be crying.

Armandito again breaks out of the relevant frame, bringing in evidence from other contexts. First, he incorrectly associates mummies and Egyptians with respect to what he read (43). Secondly, he talks about "scarey" Eskimos (52). In both cases, the contents of the talk are only very tangentially relevant to the contents of the reading. Finally, he breaks the frame completely, mock threatening Larry (56). Everyone else ignores him and they keep the task going.

(50) Billy: That's how he got the diseases.

(51) Katie: Ok, here's what I have (writing on the pad) Zimmerman did autopsies on the Eskimos and found....

(59) Armandito: And found ... evidence ... of what he (indicating Billy) said.

(53) Katie: He found trichinosis?

(54) Armandito: Em Hm.

(55) Billy: From eating polar bear meat.

Now, both boys are operating within the frame of the story topic and the play, coordinating with each other and the topics of the adults.

(56) Katie: Probably, and what else did he find?

(57) Larry: He also found out something about the women. What did he find out about the women?

(58) Armandito: They were pregnant.

Again Armandito brings a "fact" about the content of the reading that, in reality, is more like a free association to "women." There is no mention of pregnant women in the passage, only "skeletons of children."

Larry again calls Armandito on his context-mixing (60):

(59) Katie: That may be true too.

(60) Larry: But he didn't write about it in here though. What did he find in here that he wrote about?

(61) Armandito: Oil lumps, lumps. [sic]

(62) Larry: What about them? He didn't just find oil lamps, he found something out about oil lamps.

(63) Armandito: They looked like lungs.

(64) Larry: What did?

(65) Armandito: Modern day smokers?

(66) Katie: Whose lungs looked like modern day smokers?

(67) Armandito: The um. No. Those guys. Um. Those, um, those polar bears, those guys who ate the polar bear meat.

(68) Larry: Yeah.

(69) Katie: The Eskimos.

(70) Armandito: Yeah.

(71) Katie: The Eskimos' lungs look like the lungs of modern day smokers.

(72) Larry: Most specifically, the women's lungs, from smoke from those lamps.

In this entire group exchange (37-72) we see an example of the kind of interpersonal constructive work that assembles the main idea for children who are struggling to read with comprehension. Katie and Larry juggle their interpretations of the textual material along with the children's verbalizations about the topics. The adults flexibly readjust their interpretive processes as they attempt to assist the children. The adult turns bear a resemblance to "think aloud" protocols that might be elicited from proficient

readers. (See Nisbett & Wilson, 1977 and Ericsson & Simon, 1980, for opposing commentary on the validity of elicited verbal protocols; see Flower & Hayes, 1981 and Hayes and Flower, 1980, for verbal protocol used for analysis of the writing process.) As in Palincsar and Brown's reciprocal teaching, the children have a chance to witness a model of parts of the process of comprehending, not just the product.

But the adults' statements are more than introspective indexes of how meaning is derived: the statements have a communicative and pedagogical value. The transcript reveals Question-Asking-Reading activity to be a tool of instruction, coordinating the children in the activity of reading for meaning even as they struggle to decode individual words. The limits concerning which aspects of interpretation get reported are determined in part by the conversation with the children. The goal is to provide an opportunity for the children to develop relevant and coherent interpretations, not for them to "learn" a particular proper interpretation from the teacher. There can be wrong interpretations, but there is no "one correct answer" that must be learned at the expense of the diversity brought to the reading by the different children.

In other words, the exchange must deal with the fact that reading comprehension is an ill-structured immensely variable task. The adult is not providing a "scaffold" (Ninio and Bruner, 1978) for a building whose expected dimensions are known. Rather, in Vygotsky's (1978) terms, the adults in the activity setting of Field College provide a zone of proximal development, created by them and the children out of the resources that are at hand. The conversation in progress should serve as a part of the child's "dialogue with

his future" (Emerson, 1983).

Coordination in the whole activity of reading also provides for a differential diagnosis of Billy and Armandito. Although Billy does not put together a complete statement of the main idea, he indicates some comprehension by answering Katie's question about the relevance of trichinosis as well as the link between trichinosis and polar bear meat. Billy's progress in this section is notable. He starts with an answer that is a dubious index of comprehension: he reads the segment of the paragraph that comes after the last word in the teacher's question (47). We cannot tell if he understood the question or the answer that he provided; all we know is that he could find the part of the text where the hard word "trichinosis" was used, and that he could read aloud a phrase that follows it. Katie goes for more (48). Billy answers in his own words (50), but the words are strangely put together, revealing some discoordination with this comprehension question: he says "diseases" instead of "disease" making it unclear if he is referring only to trichinosis; he says "he got" although the passage suggests that more than one Eskimo had trichinosis, thus making it unclear if "he got" should be understood as "they developed" or "Zimmerman found out about." Both of these problematic utterances were conditional on a teacher's question. Finally, however, Billy (55) gives a statement in his own, coherent words.

Once before in this lesson, when he was attempting to figure out how to pronounce Zimmerman(33),Billy seemed to hit a "dead end" in the written material: while he interpreted the print on his role card into an oral rendition of the author's words, he did not use it to mediate his interactions with the world, except by ventriloquating through Larry. If Billy "goes to" to the

print, there is a good chance that he will never return, or at least that he will come back doing little expansion on whatever he takes from the text. Preventing Billy from "text binding" to his own words was quite an accomplishment on the part of Billy, Katie and Armandito. Billy takes a rest while the group focuses on Armandito. Later he collaborates with Katie to convert the group's version of the main idea into a quiz question while Armandito is physically and then psychologically removed from the task.

Armandito's difficulties and the pedagogical conversation that focuses on him is quite different. It is not only that he does not "read with comprehension." In fact, his conversation reveals extended periods of coordination with the adults in the joint activity of figuring out what the main idea might be. But, creating the conditions under which Armandito can aggregate the bits of meaning into a coherent statement applying to the story is like trying to assemble the shards of an ancient Greek vase under water; no sooner does the group assemble a few pieces than they float away.

In the segments of transcript presented so far we have seen Armandito:

- suggest an inappropriate next step in the procedure, avoiding the difficulty. (line 35)
- formulate a main idea that applies better to a previous paragraph. (line 37)
- deny that he has any information from which to figure out the main idea (he may well be correct in this!). (line 40)
- key on the Egyptian aspect of mummies rather than their well preserved state. (line 43)
- insert the words "evidence," "modern day smokers," and "lungs" into the dialogue from the text. (lines 52, 65, 63)
- introduce extraneous, but associated information from other

sources (internal organs from an anatomy lesson that morning, pregnant women). (line 41ff. line 58)

- read oil lamps as oil lumps. (61)

Precisely because he does stay in the task so much of the time after being induced to participate in it (there is only one break, when he mock threatens Larry) we can see more precisely how Armandito constantly loses the thread of the discourse.

Katie and Larry skillfully hold the task together, keeping Billy in as well, while they work to construct a coherent discourse with the shards that Armandito provides. At the end Armandito is able to provide enough evidence of comprehension (he answers, with false starts, Katie's question about whose lungs look like modern day smokers) to allow Katie and Larry to rephrase his presumed understanding in a more precise and coherent way. The adults are working to hold in enough of the written material so that Armandito's comprehension can be said to be relevant to the text instead of the myriad other contexts that Armandito brings in.

The group goes on to discuss the situation in which the Eskimos lived, revealing that the two boys have only the flimsiest notion of the Eskimos' conditions, even in oral discourse. We return to this discussion later, providing the transcription during our discussion of the test answers. Here we pick up the second half of the scripted activity involving the main idea: Katie starts to move toward formulating a quiz question:

(73) Katie: OK, so the main idea is: Zimmerman did autopsies on the Eskimos and found trichinosis and sooty lungs; did he think they were very different from modern people or about the same?

(74) Armandito: A lot the same.

(75) Katie: How come? They all looked the same? Where? What parts of them look the same? (no answer) OK. How can we make this into a question?

(76) Billy: I don't know

(77) Larry: How could you make this into a question? A question you know the answer to on your test? A good question you can use on the test?

(78) Armandito: How did they find the mummies? (a suggestion for a question, not a question.)

(79) Katie: Let's do it on this paragraph.

Once again we see Armandito responding to a question about the text by supplying information relevant to some other context (78). Katie corrects him, as she and Larry had done before. Katie now turns to the summary sentence and tries to use it to get to the question for the quiz. Armandito walks away from the table. The others continue Question Asking Reading.

(80) Katie: (to Billy) Think about this.

(81) Billy: (Reads topic sentence slowly) Zimmer--what's his name?

(82) Katie: Zimmerman

(83) Billy: Zimmerman made...

(84) Katie: autopsies

(85) Billy: yea, autopsies on Eskimos and found...what?

(86) Katie: Trichinosis

(87) Billy: Yeah, and he found what? ... And what did he found?

(Armandito returns, carrying a sheet of paper printed in the same style as the paragraph the group has been working on.)

(88) Katie: Zimmerman did autopsies on Eskimos and what did he find? (She speaks while she is writing the question

on the pad at the easel.)

(Armandito is reading outloud from the paper he brought in. It is about a medical discovery; it is from a paragraph that was a part of the previous week's activity; he had picked it out of the teachers' supply box while he was away from the table.)

Billy gets Katie's help with words (81-82, 83-84). But next he makes up a question (85) for the quiz, while Katie responds as if he is doing the "text binding" that he has done before (33 and 47) and as if he is again asking for help with a hard word. Finally (87), Billy reformulates his question in a more obvious word order. Katie recognizes it and writes it as a question for the quiz, providing a bit of additional morphology ("find" for "found"). Here we see Billy independently carrying out the task of making a "good question" (81-87) over several turns, in spite of Armandito's apparent defection from the work.

When Armandito stops reading outloud, he begins speaking to Larry. We do not quote the dialogue here because it will not make sense to the reader without a lengthy explanation. Larry recognizes that what Armandito has done is to bring a paragraph from the previous week's reading on which he had already been tested. He begins to discuss its meaning with Larry who protests.

(89) Larry: We read this before!

(90) Armandito: I know (goes back to reading aloud...)

Katie reads Billy's reformulated question aloud. Armandito ignores her and keeps reading aloud his paragraph.

(91) Larry: Very good question. (to Billy and the group)

(92) Katie: Too bad Armandito didn't hear it.

(93) Larry: Armandito. How would you answer Billy's question?

It appears that when Armandito leaves the table, he is leaving the task of text comprehension. His behavior subsequently reveals that this is not entirely the case. Instead of entering the task of text comprehension on the present text, at the level the group had moved to, Armandito went to a previous text which he had already practiced comprehending and been tested on. He remained in the task of text comprehension in a very interesting way: he was mimicking all those aspects of text comprehension that he could manage on his own. His "doing comprehension" involved using a text for which the whole activity had previously been completed successfully; not only had some general scripted activity been done before but precisely this text that he found had already been acted out on a previous occasion.

For the other members of the group the comprehension task is "making up a good question about the paragraph we have been reading and talking about"; for Armandito the comprehension task is not constrained in the same way. Instead, it involves bending over a text (that has proven to be comprehensible to Armandito, even on a test) and providing an oral rendition, reading aloud. When he reads outloud, (41ff,44,58.,78) those other contexts do not intrude. Unfortunately, he appears oblivious to the normative judgement that sticking to the wrong text will not work either. He has already comprehended lots of aspects of the world in a very impressive way (Egypt, internal organs, pregnancy) which he has displayed for us thanks to the mediating structure we set up. However, his reading does not orient itself to coordinating the comprehension of the word and the world in the present context.

The problem is that Armandito has the wrong mediation of the activity of reading, one that is fatally cut off from the correct form of comprehension because in many situations it passes. Armandito is a master at assembling bits of meaning from a situation he does not understand the way adults do; he creates the impression that he understands quite fully.

Evaluation of quiz answers; shortcomings and remedies

The last line of evidence that we will offer for the efficacy of Question Asking Reading as a diagnostic reading activity comes from an examination of the way in which Billy and Armandito answered the quiz following their reading of "Frozen Window on the Past." Most of the questions on the tests that Armandito, Billy and the other children took after each group lesson were designed to require them to deal with the main idea, however varied or vague the concept may be. The boys were given the entire text when they took the quiz. Two example questions, the boy's answers,[3] and an "ideal" adult answer follows:

1. What did Zimmerman find when he did the autopsies? (paragraph 3; question made up by the boys' group):

   Armandito: They found oil lumps and disease.
   Billy: Trichinosis and the lungs have lots of smokers.
   Adult: He found that people living in Alaska long ago had diseases similar to those found among modern people.

Both boys' answers are relevant to the question but each is at least incomplete and perhaps inaccurate. Armandito does not restrict his answer to the normal semantic range of "autopsy," responding instead (it appears) to what

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3. In this presentation, we have standardized the spelling provided by the boys. In general, Armandito's spelling is less standard than Billy's is.

Zimmerman found in some more general sense (lumps/lamps). Billy names correctly the disease referred to by Armandito and adds a second fact relevant to the category, "autopsy."

However, both boys seem to have failed to express the real point. A "main idea" answer should index the idea that the Eskimos from long ago had diseases similar to those found in modern people. The boys read this paragraph in their group with adult help; their group made up the question while discussing the main idea of the paragraph. In spite of this evident advantage, neither of the boys' answers reflect what one might consider the main idea and the idea that ties the report of Zimmerman's findings to the rest of the newspaper story. Differences in the degree of local adequacy of the boys' answers are overshadowed by the similarity of their missing the general point.

2. How did the family die (paragraph 2; question made up by the other group).

Armandito: the temperature was too high.
Billy: because they froze in the ice.
Adult: They were crushed and frozen in a storm.

At this juncture, we may be tempted to conclude that Armandito either did not understand the question at all, or has decided to make a joke instead of answering it. Billy, on the other hand, is correct in saying that the family froze in the ice. What he left out is how the ice got into the tunnel/cave home where the remains were found.

Without access to more information, such as that given in the transcript of the reading lesson itself, it is virtually impossible to interpret and score precisely such answers as Alejandro's outrageous claim that the Eskimos

died because of high temperature. But with the transcript, or alternatively, if a teacher remembers the children's in situ interpretations, we can learn more about reading difficulties such as those experienced by Armandito.

The question about the cause of the Eskimos' death had been made up by the other reading group and it was about the paragraph that Alejandro and Billy had not seen until they took the test. But the source of misunderstanding can be traced back to part of the dialogue that we did not present earlier. [4] It provides an example of how Armandito's conversational involvement can mask from adults the incorrect interpretations that he forms.

Katie and Larry have summarized the conversation about the lungs and the oil lamps/lumps, one emphasizing the similarity of past and present lungs, the other emphasizing the causative link between the lamps and the condition of the preserved lungs. Armandito makes a topic-relevant remark, suggesting an alternate explanation:

(94) Armandito: They probably smoked in those days.

(95) Katie: Nope. They had these oil lamps and they lived in these caves underground and they burned oil lamps all the time so they could see what they were doing and the smoke had no where to go. Must have been pretty gross.

(96) Larry: They lay down by them (the oil lamps) and lived by them all the time.

(97) Armandito: That's too bad. Couldn't they go outside?

(98) Larry: Yeah.

(99) Katie: It was 100 degrees below zero.

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4. It occurs temporally between the sequence ending with utterance 72 above and the one beginning with utterance 73.

(100) Larry: It was cold outside and dark inside and they wanted to have some light.

(101) Armandito: They can go outside with flashlights.

(102) Larry: Not back then, buddy.

(103) Billy: A torch.

(104) Katie: They didn't have them.

(105) Armandito: They could have figured out how to get a torch but if it's 100 degrees you're bound to stay inside.

(106) Larry: Uh huh, and you need some kind of light that won't cause fires.

(107) Armandito: And flashlights.

(108) Katie: They didn't have ray-o-vac batteries in those days. (Katie then redirects the task to making a question, see 80 above.)

From this interchange the children could derive some information relevant to the paragraph which they did not read in the group but had to read and answer questions about in the test. It is clear that Armandito has very little understanding of the real situation of the people he has been reading (and drawing) about. He appears to have little appreciation of the climactic conditions or of the fact that there may have been a time when flashlights did not exist.

Armandito has, however, been engaging in an act of comprehension: he has been using what he knows about the world and applying it to interpret the situation of the people being discussed. Armandito acts like a tenacious problem solver, but he has great trouble holding on to the elements and keeping them straight. Billy on the other hand, reveals little of what he is thinking. Note, however, that he comes up with a plausible alternative to flashlight. In the general confusion, Armandito's statement (105) that "if

it's 100 degrees you're bound to stay inside" passes for a reference back to line 99, where Katie refers to 100 degrees below zero.

While it may appear that Armandito appreciates the dangers of a cold 100 degrees, consider his answer to the quiz question: he wrote "the temperature was too high" in response to the question about how the Eskimo family had died. The "below zero" that an adult could assume was just a slip-up in the utterance of line 112 appears to be more than a slip. Born and raised in Southern California, Armandito knows from his own experience that when it is 100 degrees it is too hot for comfort, just as he knows that when it is dark you need a flashlight.

These facts and this conversation are a part of the knowledge that Armandito brings with him to the comprehension question about the new paragraph. Once again, instead of supplying background information that is appropriate to the specific context of the printed passage, Armandito is substituting information from his prior experience that has been accepted as appropriate in a prior conversation. The twist in this case is that the test reveals a discoordination in the prior talk that the adult participants did not detect: by "filling in" the "slip" as they often did with Armandito, they could construct a plausible interpretation of his talk in the context of the conversation. This time, instead of being confronted with one of Armandito's context mixing moves when they were trying to stick to the text, Katie and Larry inadvertently supplied a conversational context that Armandito relied on without coordinating it with the written material in the new paragraph.

Summarizing the diagnoses: the usefulness of competing approaches

The transcript of this small part of a lesson allows us to characterize differences between Armandito and Billy that were not accessible from more standard and less reading specific measures. The data presented in the transcript are our evidence for the existence of a model diagnostic system in Luria's terms. An artificial activity was set up and entered into on a voluntary basis. Evidence for the children's "hidden processes" (in current terms, their conception of the reading process) comes from the way that their behavior disrupts the coordinated flow of full Question Asking Reading script for reading group. In so far as their utterances presuppose the existence of common activity, they bespeak the voluntary nature of the children's participation. The degree of their coordination and the reasons for discoordination then become the evidence upon which to reach differential diagnosis.

Billy is a poor reader as judged by his teachers or a standardized test. But he is not a poor reader in the same manner that Armandito is. He coordinates around the text with Larry and Katie in a qualitatively different way than Armandito.

The contrast between the two boys in terms of our structural representation of reading (Figure 2) is provided in Figure 5. On the left we represent the fact that Billy often restricted he actions to providing an oral representation of the contents of the text, with no effort to interpret it in light of his existing real world knowledge. This restriction is expressed in the figure by the absence of a child-world link. In terms of Figure 5, Armandito displays the presence of two different of the three links needed to complete the full act of reading; he can orient to, and provide oral renditions of, the

text (C-T link) and he can provide direct interpretations (not mediated by the text) of the part of the world topicalized by the test (C-W link). But the link between the text and world topicalized by it is missing (the T-W link).

These different patterns of difficulty imply different kinds of "gap-filling" that will have to be accomplished through participation in reading instruction. In the case of Billy, the supplementary coordination needed to replace the missing C-W link runs through the adult, who helps by constantly bringing real world information into juxtaposition with Billy's (more or less adequate) text-mediated knowledge. In the case of Armandito, the adult must supplement the text-world (T-W) link and coordinate it with both Alejandro's decoded representation and his representation of the world (presumably) topicalized by the text. At first glance, this task might appear relatively simple because Armandito often displays great ability to talk with adults and to draw on information from that talk when it comes to discussing the main idea of a paragraph. In fact, despite his obvious difficulties, when the teacher/researchers graded the quizzes during the training sessions, Armandito received higher scores than Billy. Perhaps he "passed" on the basis of his evident problem solving tenacity, his ability to work within collegial conversation where everyone fills in for everyone else, acting as if what is known is shared knowledge. He is impressive as he mediates his interactions with the world through language; just as impressive, though, is the debilitating size of the world that Armandito acts as if he should be responsible to and for at any given time. Whether we call them contextual boundaries or functional barriers, Armandito does not seem to have what he needs to separate out the world in a way that makes it easy to perform constrained acts like interpreting a specific printed passage. This is not a learning disability

specific to print; it is a much more pervasive disability in thinking that pervades his interactions with the world, and it is not clear how it can be effectively re-mediated.

A Standard Experimental Evaluation of Question Asking Reading

Despite the difficulty of reconstructing the flow of interaction from transcripts, we hope that our detailed presentation of a segment of interaction from a session of Question Asking Reading makes it at least plausible to believe that it has potential as a diagnostic tool. However, many questions remain: Even if Question Asking Reading has promise as a diagnostic procedure, is it an effective instructional procedure? Equally important, does Question Asking Reading have potential for use in regular school settings, or must it be considered an arcane, labor-intensive methodology that cannot exist outside of the rarified atmosphere of a research project? Neither of these questions can be answered adequately by the research conducted at Field College. While many of the children who participated in the after school activities improved in their school performance (Billy and Armandito among them), Question Asking Reading was only a part of the experience of Field College and in any event, we did not employ a control group design that would rule out increased performance as a result of normal school experiences.

In an attempt to assess the educational potential of Question Asking Reading among poor readers in the upper elementary grades and to determine if it could exist outside of the special circumstances of Field College, the research reported above was replicated in a follow-up experiment which included appropriate control conditions, more stringently quantified pre- and post-test measures, and was conducted in a school in the morning before

regular classes began (King, 1988). The children in this second study were from a different school and neighborhood than the one where we conducted our initial research, but they were similar to the children who attended Field College in the heterogeneity of their backgrounds and the unusual difficulties that they were experiencing in learning to read.

In addition to testing the effectiveness of Question Asking Reading when compared with a no-treatment control group, King sought to contrast our procedures for coordinating teacher, helper, and children around a script for reading with the kind of structured intervention proposed by Scardamalia and Bereiter (1985), which they call "procedural facilitation." On the basis of analyses of the differences in composition strategies that distinguish novice and expert writes, Scardamalia and Bereiter generated a set of prompts (procedural facilitators) that were designed to guide and constrain the actions of beginning writers. Sample prompts included such phrases as "I could develop this idea by adding...," "But many readers won't agree that..." and "This isn't very convincing because..." Their research shows that children who were instructed in how to write using their method of procedural facilitation produced more advanced compositions and maintained their advantage later even when no prompts were provided. King speculated that the use of written prompts as procedural facilitators might also work in reading instruction. If that were the case, then it would seem that the small group instructional format of Question Asking Reading would be unnecessary to its instructional goals, although it might retain interest for diagnostic purposes.

To test these ideas, King constructed a reading analogue of procedural facilitation using specially designed worksheets. Children assigned to this treatment condition worked independently. Each worksheet had a paragraph to be read at the top followed by the following exercises (with space alloted on the sheet to complete each): Words that are hard to say, words that are hard to understand (look in a dictionary), A main idea of this paragraph is:, A good question for the main idea is:, This is what might happen next:.

There were three groups of 5-6 children each assigned at random to one of three experimental conditions: A no-treatment Control group, a Procedural Facilitation group, and a Question Asking Reading group. The research was conducted in the school library before school began. Children came for an hour two mornings a week for a total of 16 intervention sessions. Pre- and post-tests were administered to both treatment groups as well as a no-treatment control group. The pre- and post-tests included novel materials as well as the contents of the training passages. Daily comprehension quizzes were also given, which consisted of both teacher-constructed and student-constructed questions about the main ideas of the passages. In addition, qualitative data in the form of transcripts of audio-tape recordings and field notes were collected.

King's results support our initial findings. Although diagnostic information on the children was obtained, we will focus here on outcomes that could be related to the intervention procedures as a whole. Students in both treatment groups significantly increased their reading comprehension scores compared to the control group, providing some evidence for the effective of procedural facilitation as a training method. However, the students in the Ques-

tion Asking Reading group learned and/or retained significantly more material from the training passages than did the students in the Procedural Facilitation group. The greatest contrast between the two groups was in the proportion of intervention time spent actively engaged with the text. The students in the Question Asking Reading condition not only spent more "time on task"; they also demonstrated a greater interest in what they were reading and in the comprehension activities, lending support to our notion that motivation to read can be increased by properly constructed small group reading lessons.

We believe that the facilitating effect of Question Asking Reading over and above that of Procedural Facilitation is a consequence of the form of social interaction that it requires and promotes. In effect, well orchestrated social interaction around interpretation of the text increases the meaning-making resources of participants. The Question Asking Reading and Procedural Facilitation groups had the same intra-psychological resources including their prior literacy skills and their own motives for working on the task. As inter-psychological resources, children in both groups had dictionaries, a teacher and a teacher's aid from whom they could obtain certain kinds of help, upon request, and the expectations of the teacher and their parents that they would work hard in the program. The act of reading for both groups was mediated by a set of prompts which abstractly embodied the adult version of reading comprehension. But in the procedural facilitation group, it was largely up to the individual child to grasp the relationship between the prompts, between the prompts and the text, and between the sequences of prompts and the whole act of reading as a process of expanding one's beliefs about the world.

Although the students in the Question Asking Reading condition had the same intra -psychological resources, the inter-psychological resources available to them were much greater. Their reading activity was meditated not only by a set of prompts but these prompts were explicitly made part of a scripted activity in which the instructor and her aide played an active organizing role. As in our earlier study (and despite the relative formality of the school library setting) the social interaction flowed freely. Without having to ask, words were spelled out, pronounced, and defined both in general terms and in context. Different paragraph level interpretations were debated and the relationship between paragraphs publically were mulled over.

The mediation by others also meant that the students in the Question Asking Reading group had access to new motives for the activity. Intermixed with the support activities were numerous conversations about the world and the text represented in the world, and about the specific procedures for coordinating the two. Adults and more capable peers demonstrated a genuine interest in the passages and their interpretation.

Students in both groups were motivated by the threat of remaining poor readers, compared to their peers, the consequences of which, including difficulty in other school subjects, they were beginning to be aware of. The world represented by the texts motivated many students, the topics were interesting and worth at least some minimal effort at understanding. And students in both groups were greatly motivated by the opportunity for social interaction, the opportunity to meet and to talk.

However, in the Procedural Facilitation group, the desire for social interaction was not compatible with the motives designed into the activity: improving one's reading skills by reading difficult, expository texts with complex contents, and actively engaging the procedural facilitation exercises. By contrast, Question Asking Reading, engaged the students to a greater degree in the kinds of activities which would be expected to promote the development of reading comprehension, organized by participant structure in which social interaction was the medium for instruction, and in which more adult reading strategies, and motives for reader were accessible for imitation, reflection, and appropriation.

Section 5: Conclusions

The results of King's work give us some confidence that Question Asking Reading does, in fact, represent a useful model system for the diagnosis and remediation of reading disabilities. As demonstrated in the initial study, on those occasions when the group becomes coordinated around the reading script, it is possible to carry out rather fine-tuned differential diagnoses that pinpoint the difficulties encountered by individual children. As demonstrated in King's follow-up study, the conditions that create the methodologically appropriate conditions for diagnosis are simultaneously the conditions that promote the acquisition of reading.

These results provide support for the theoretical and methodological approach developed at some length in this chapter. Reading, we can conclude, is an emergent process of meaning making that occurs when information topicalized by text and prior knowledge are synthesized as part of a general process of "reading the world." Moreover, it is useful to conceive of the process of

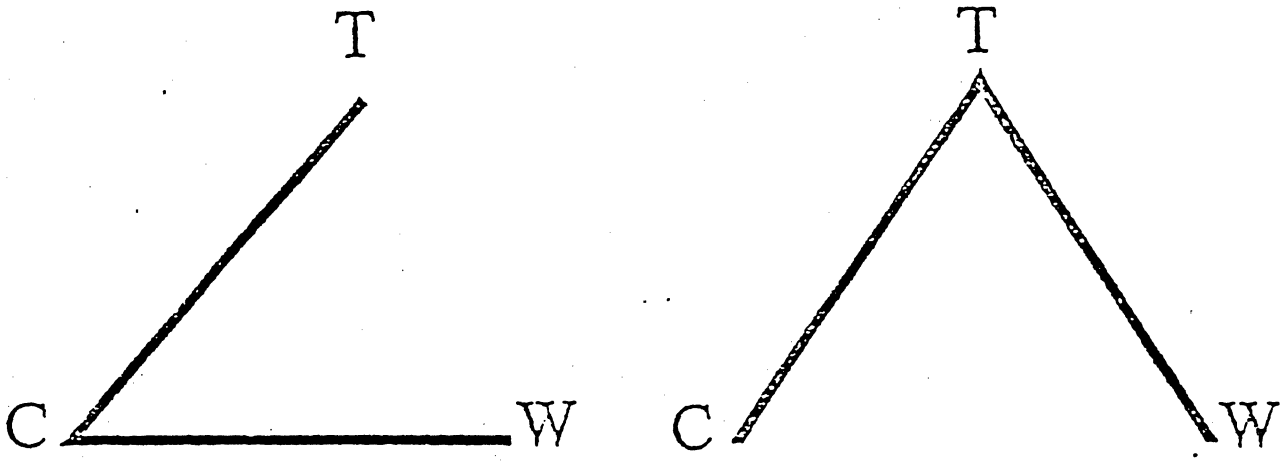
acquisition as truly developmental in nature. Where this description differs from other developmental accounts of reading acquisition is in its emphasis on the special role of the teacher in arranging the conditions that coordinate existing systems of mediation (Child-Adult-World, Adult-Text-World) in coordinated systems of activity subordinated to the goal of comprehension. It is, in this sense, a synthesis of theories such as those proposed by Chall and the Goodman's which is best described as a "re-mediation" theory of reading and its acquisition. Although we are pleased with the theoretical progress we have made we are painfully aware of the shortcomings of this work.

First, we are not satisfied with the manner in which we have been forced to present the results of in situ process analysis of the children's individual reading patterns. A much fuller appreciation of the nature of the activity can be gained from a videotape of a teaching/learning session than from a transcript and auxilliary written description of what transpired; but to make available such an audio-visual record would require both a high quality in the original taping and a means for distributing the tape along with the written report. Neither option was available to us. Hence, while we believe that we have made a plausible case both for our theoretical claims about the process of reading and its acquisition, we would like to be able to present the data in a more accessible way.

Second, we acknowledge that we have only taken preliminary steps toward demonstrating the practical utility of our procedures to those who accept its utility in principle. We find it encouraging that King was able to conduct Question Asking Reading independent of the other features of the afterschool activities that we had organized as part of Field College. Elementary school

children are not well known for their eagerness to do extra school work before school, so it is no small achievement that children would come twice a week before school for two months and spend the bulk of their time there actually engaging in reading. However, the magnitude of the treatment effects obtained by King were modest, despite their statistical significance. Teachers are rightly concerned with educational, not statistical significance. Hence, we are anxious to see a test of Question Asking Reading as a regular classroom activity conducted by a regular classroom teacher over at least a semester of instruction.

Is such an application practical? After all, as we have noted above, Question Asking Reading requires a minimum of two competent readers who can hold together the scripted activity of reading for meaning even when many of the participating children cannot read independently. This requirement clearly precludes applications in situations where there is only one teacher and no possibility of a teacher's aide or cross-age tutoring by older children. However, Question Asking Reading (especially if it were supplemented by the kind of procedural facilitation methods that King developed on the basis of Scardamalia and Bereiter's work) is perfectly suited to classrooms that adopt activity centered approaches and any classroom where small group instruction is the preferred format for reading, so long as there is the possibility of finding one cooperative "good reader" to work with the teacher to make sure that the full scripted activity remains in force.



3A: Armandito

3B: Billy

Figure 3: Routes of Reading Difficulties

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