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ABSTRACT

A microanalysis was completed of 3,003 oral reading error episodes during 72 small-group reading lessons involving 116 students in three second-grade and three third-grade classrooms. Factors were investigated that influenced: (1) oral reading errors made by readers; (2) the readers' reactions to their own errors; and (3) the teachers' feedback following errors. Characteristics of errors were influenced by such factors as the individual reader's comprehension ability, the difficulty of the text, and teacher rates of feedback. Readers' reactions were generally influenced by the same set of factors, together with the characteristics of the errors themselves. The patterns of teachers' feedback suggested that they were juggling several goals: maintaining pace, preserving meaning, and helping students who were having difficulty with decoding. One way in which teachers appeared to reach a compromise among these aims was to employ stereotyped feedback routines. Results support the idea that the actions of students and teachers during error episodes are situated in social contexts, emerging in response to a dynamic interplay of factors that converge at particular moments. (Six tables of data and a figure representing the network of relations among errors, reactions, and feedback are included; 61 references are attached.) (Author/RS)

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SITUATED ACTIONS DURING READING LESSONS: A MICROANALYSIS OF ORAL READING ERROR EPISODES

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Abstract

A microanalysis was completed of 3,003 oral reading error episodes during 72 small-group reading lessons involving 116 students in three second-grade and three third-grade classrooms. Factors were investigated that influenced (a) oral reading errors made by readers, (b) the readers' reactions to their own errors, and (c) the teachers' feedback following errors. Characteristics of errors were influenced by such factors as the individual reader's comprehension ability, the difficulty of the text, and teacher rates of feedback. Readers' reactions were generally influenced by the same set of factors, together with the characteristics of the errors themselves. The patterns of teachers' feedback suggested that they were juggling several goals: maintaining pace, preserving meaning, and helping students who were having difficulty with decoding. One way in which teachers appeared to reach a compromise among these aims was to employ stereotyped feedback routines. The results support the idea that the actions of students and teachers during error episodes are situated in social contexts, emerging in response to a dynamic interplay of factors that converge at particular moments.

SITUATED ACTIONS DURING READING LESSONS: A MICROANALYSIS OF ORAL READING ERROR EPISODES

Student: (Reading orally) Josie didn't know what to do. She was happy and sad at the same time. She had found Cap, but she had not sold the fruit. So s . . . she had no really . . . ly [text says *real*] leather
Teacher: No real
Student: No real leather shoes to give to her grandfather . . . for his birthday. She turned away from the marketplace and started to walk slowly home.

Every day, millions of elementary school children participate in oral reading lessons and in oral reading error episodes like this one. An error episode is the sequence of events initiated by an oral reading error during a reading lesson. In its prototypical form, the error episode is a series of three events. First, the reader makes an oral reading error ("really"). Second, the reader reacts to his or her own error (in this case, repeating "ly" and then continuing with the next word). And third, the teacher provides feedback ("no real"). Although this is the most common pattern for oral reading error episodes, one of the final two events is sometimes absent. The teacher sometimes chooses not to give feedback. Or, the teacher offers feedback so quickly that the reader has no chance to react to his or her own error.

The present study is a detailed investigation of oral reading error episodes. Our purpose is to identify the factors that converge moment by moment to influence what happens at each step of the oral reading error episode. The study is one in a series of microanalyses investigating a number of aspects of small-group reading lessons (Anderson, Mason, & Shirey, 1984; Anderson, Wilkinson, & Mason, 1991; Imai, Anderson, Wilkinson, & Yi, 1992).

Why study oral reading errors? One answer is that oral reading is extremely common in elementary school classrooms, particularly in the lower grades (Allington, 1984; Kurth & Kurth, 1987). A better understanding of oral reading error episodes may show how to improve oral reading lessons.

Another and, for us, more important reason to study oral reading error episodes is to test implications from an evolving sociocognitive theory, which says that thought and action are *situated*, in the sense that they depend in a fundamental way on the immediate context. The error episode is a part of the mundane reality of the elementary school classroom, a representative but bounded example of instructional practice. Characteristics typical of teacher-student interactions almost certainly emerge in oral reading error episodes. Therefore, the study of error episodes affords the opportunity for a close examination of prevailing instructional practices within a circumscribed, analytically tractable event, and offers the prospect of illuminating some of the general principles that govern classroom practice.

The theory of situated cognition asserts that cognition is contingent upon particular tasks and particular social contexts (e.g., Brown, Collins, & Duguid, 1989; Newman, Griffin, & Cole, 1989; Rogoff, 1990; Vygotsky, 1978). According to this view, the actions of students and teachers during the oral reading error episode are *situated actions* that depend on how various factors converge at a given moment. The errors that students make, their reactions, and their teachers' feedback should all be highly sensitive to the current context. Participants may begin an episode with a common goal, but according to the theory the route toward that goal is determined by factors inherent in the dynamic interplay of people and situations (cf. Agre & Chapman, 1987; Suchman, 1987).

One can distinguish between moderate and extreme formulations of situated action theory. According to the extreme version, classroom actions are so situated that generalization across contexts is next to impossible. The more moderate formulation also assumes variation from context to context, but it

further supposes that there are recurrent patterns of elicitation and response. If this supposition is correct, it ought to be possible to discover useful contingent generalizations that specify how thought and action vary as a function of identifiable aspects of situations.

A different possible formulation is that the error episode is governed by a *script*, or stereotyped routine, such that episodes are enacted again and again in more or less the same way regardless of situational factors. Putnam (1987) found that math tutors tended to follow a relatively invariant script, and a script-like account might hold true for oral reading error episodes, as well.

An overarching purpose of the present study was to determine which of the foregoing formulations gives the best account of the oral reading error episode. The strategy was to examine whether aspects of the error episode depend upon such factors as the reading level of the individual children, the reading level of groups, the difficulty of the text, particular features of the errors that were made, the readers' reactions to the errors, or the nature of teachers' feedback. If the error episode unfolds in the same way regardless of these features, the formulation that says that the error episode is governed by a script will receive a measure of support. Conversely, to the extent that aspects of the error episode are contingent upon one or more situational factors, the situated action theory will be supported. If no transituational generalizations, even contingent ones, prove possible, a radical formulation of the theory will increase in attractiveness.

Assuming the actions of students and teachers during oral reading error episodes prove to be at least somewhat context-sensitive, further questions become interesting. For example, do students' errors and reaction patterns lead teachers to give particular types of feedback, which in turn reinforce students' tendencies to make those same errors and display the same reactions? Are some kinds of errors and reactions influenced more by the immediate social context, and could others be influenced more by individual ability and by characteristics of the task? What goals guide teachers as they give feedback? Do teachers follow a single overriding goal, or do they attempt to balance several competing goals? If the latter is true, then which of the goals takes precedence at a given moment in a particular context?

To understand the factors that are likely to play a role in shaping oral reading error episodes, we turn to the literature on oral reading errors.

Research on Oral Reading Errors

Oral reading research has tended to focus separately on the three events in the oral reading error episode: the errors, readers' reactions to their errors, and the teacher's feedback. We review the research on each of these events, and as we do so, we note some of the unanswered questions that our study addresses.

Oral reading errors. Prior to Kenneth Goodman's influential research on miscues, researchers looked primarily at the overall rate of reading errors and at the rate of particular types of errors like substitutions, omissions, and insertions (Leu, 1982). Goodman showed the value of dividing errors into categories such as semantically acceptable and semantically unacceptable errors and errors that are graphophonemically similar or dissimilar to the target word in the passage (K. Goodman, 1969; Y. Goodman & Burke, 1972). A typical research finding was that poorer readers tend to make more errors that are graphophonemically similar to the target word but semantically unacceptable; better readers tend to make errors that are semantically acceptable. Such findings supported a top-down view of reading, in which good readers are adept at using context to decode words. Research using other methods, however, has demonstrated that good readers use both context and graphic cues. Good readers are efficient at using context as they decode, but they also attend to almost every graphic cue present in the text. Poor readers tend to be over-reliant on context (Juel, 1991; Stanovich, 1991).

A shortcoming of many studies employing miscue analysis is that they have ignored the difficulty of materials (for reviews, see Leu, 1982, and Wixson, 1979). Several studies have showed that readers--both good and poor--tend to rely more on graphic cues and less on contextual cues as the difficulty of passages increases (Biemiller, 1970; Hood, 1975-1976; Kibby, 1979; Tamor, 1981). In an especially well-designed study, Blaxall and Willows (1984) found that both good readers and poor readers tended to make a smaller proportion of grammatically and semantically acceptable errors as passage difficulty increased. However, good readers, but not poor readers, made a larger proportion of graphically similar errors as passage difficulty increased. The authors concluded that good readers adjusted reading strategies to conform to the difficulty of text more than poor readers did.

Does the instructional approach have an effect on the types of errors made by readers? Several studies have shown that the overall approach of the reading program has a clear effect on the types of errors that students make. (For a review, see Wixson, 1979.) Programs that emphasize phonics lead to fewer omissions, fewer semantically acceptable errors, but more graphophonemically similar nonwords. Programs that emphasize meaning lead to more errors that are real words, errors with less grapho-phonemic similarity, and more semantically appropriate errors.

Several important questions remain unanswered about the effects of feedback on student errors. Do the instructional approach and the nature of teacher feedback take effect only over the long run so that general patterns of feedback take weeks and months to have an impact on patterns of errors, or do page-by-page or story-by-story variations in teachers' feedback patterns affect patterns of errors? The research reviewed by Wixson (1979) establishes that there are long-term effects of feedback. This study investigates whether there are short-term effects as well.

Readers' reactions to their errors. Hoffman and his colleagues (Hoffman & Clements, 1984; Hoffman, O'Neal, Kastler, Clements, Segel, & Nash, 1984) have collected extensive data on how second graders react when they have made an oral reading error. Compared to low-skilled readers, high-skilled readers self-correct on a larger proportion of their errors and also ignore a larger proportion of their errors. Low-skilled readers are more likely than high-skilled readers to pause following an error or to have no opportunity to react because the teacher jumps in with immediate feedback (Hoffman et al., 1984). Closer inspection of these data reveals that when only errors on which the readers have an opportunity to react are considered, the most common reaction of both good and poor readers is to ignore the error, and the second most common reaction of both groups is to self-correct.

Hoffman and Clements (1984) demonstrated contingencies between the type of error and the reader's reaction. For example, high-skilled readers tend to self-correct after mispronunciations and high-meaning-change omissions and to continue reading after insertions, low-meaning-change omissions, and substitutions. Low-skilled readers, by contrast, are most likely to be given no opportunity to respond after most types of errors.

Reading educators have been particularly interested in self-corrections. Self-corrections have been viewed as an indicator of strategic reading and self-monitoring (Clay, 1985). Good readers self-correct on 20-35% of their errors; poor readers self-correct on only about 5% of their errors (Clay, 1969; D'Angelo, 1981; Weber, 1970). Fleisher (1988) has linked self-corrections to a strategy of attending to graphic information, which is known to be characteristic of good readers (Stanovich, 1991). Recently, however, several researchers have suggested that the difference between good readers and poor readers on self-corrections may be an artifact of text difficulty. Good readers self-correct much less often as texts become more difficult, and poor readers self-correct much more than usual when given easy texts (McNaughton & Glynn, 1981; Share, 1990; Thompson, 1984). If one assumes that, during oral reading lessons in the typical classroom, good readers tend to be given stories that are easy for them whereas poor readers receive a diet of stories that are rather difficult for them, the apparent strategy difference between good and poor readers may dissolve.

Numerous questions remain unanswered about readers' reactions to errors. We do not have a good picture of the full range of factors that influence readers' reactions. Although Hoffman and Clements (1984) linked particular reactions to particular types of errors, they did not consider the full range of variables that could influence readers' reactions, such as individual reading level, characteristics of the text, grade level, and patterns of feedback. Our study attempts to provide a fuller understanding of the factors that mediate reactions.

Teachers' feedback following errors. Hoffman and Clements (1984) observed that when a reader makes an error, the teacher is faced with a series of three decisions: (a) whether to give feedback at all, (b) when to give feedback, and (c) what type of feedback to give. Following Brophy and Evertson (1977), the two types of feedback that have been studied most extensively are *terminal feedback* (telling the reader the correct word) and *sustaining feedback* (giving a hint or an exhortation to try again). The generic picture of teacher feedback has been quite consistent across studies. Teachers give feedback after most errors, they often interrupt readers to give immediate feedback without allowing the reader the opportunity to notice and react to her own error, and they tend to give a lot of terminal feedback (Allington, 1980; Hoffman et al., 1984; Hoffman & Clements, 1984; Spiegel & Rogers, 1980).

This generic picture, however, is a bit misleading. Teachers appear to make systematically different feedback decisions with high and low reading groups. To start with, teachers are more likely to give feedback to readers in low groups than to readers in high groups (Hoffman & Clements, 1984). Teachers are much more likely to interrupt low-group readers with immediate feedback, not waiting to give the reader a chance to self-correct (Allington, 1980; Hoffman et al., 1984; Hoffman & Clements, 1984). Teachers also give much more terminal feedback to readers in low groups and more sustaining feedback to readers in high groups (Hoffman et al., 1984; Hoffman & Clements, 1984). Low-group readers receive more graphophonemic feedback; high-group readers receive more meaning-focused sustaining feedback (Hoffman & Clements, 1984).

It is clear that teachers treat readers in low reading groups differently from readers in high reading groups. What is less clear is why this is so. Exactly what are teachers responding to when they give differential feedback to different groups? Group ability level, individual reading comprehension level, the type of errors made by readers, and readers' reactions are intercorrelated. Do poor readers receive more terminal feedback simply because they are poor readers or because they tend to make different types of errors and react to their errors differently? The hypothesis that teachers' actions are situated suggests that although teachers may be guided by overarching goals, teachers react in large part to specific types of errors and reactions. Consistent with this hypothesis is Pflaum, Pascarella, Boswick, and Auer's (1980) finding that student error types predicted twice as much of the variance in teacher feedback as did reading ability. This suggests that teachers were responding primarily to type of error, not to the students' ability per se.

A final purpose of our study, then, was to explore the structure of teachers' decisions about feedback. We sought a comprehensive understanding of what influences teachers' feedback decisions. We also sought possible answers to the question of *why* teachers give the feedback that they do. Any patterns found in feedback decisions might allow us to infer some of the aims that underlie their decisions about feedback.

In summary, the general goal of the research reported in this paper was to analyze the dynamics of oral reading error episodes. We sought to discover the factors that influence each of the three major events in the oral reading error episode: the error, the readers reaction to the error, and the teacher's feedback to the error. Because oral reading is a social activity, we expected to find evidence that students were influenced by teachers' behavior, and vice versa. That is, we expected to find evidence of reciprocal causation within a system of interacting forces.

Method

Subjects

Six teachers and their 116 students (56 boys and 60 girls) participated in the study. Three of the teachers taught second grade and three taught third grade. Exactly half of the students were second graders, and half were third graders. The six classes in the study were drawn from three schools chosen to make the sample as diverse as possible. One school was in a rural area, the second in a low-income area of a small city, and the third in a middle-income area of another small city. One second-grade class and one third-grade class were chosen from each of the three schools. The teachers, all of whom were female, participated voluntarily in the study. All six were experienced at the elementary school level, and all used a commercial basal reading program.

There were 81 white students, 22 black students, and 13 students of other ethnic backgrounds. The students' average score on the reading comprehension test from the Metropolitan Achievements Tests (MAT) (Prescott, Balow, Hogan, & Farr, 1986), administered in the fall just before the study was conducted, was 5.9 stanines, with a standard deviation of 1.8. These figures compare with the national average of 5.0 and the national standard deviation of 2.0.

Design and Materials

Each of the six teachers indicated that early in the school year she had divided her class into a high, an average, and a low reading group. The teachers met with these already constituted groups during the course of the study. Each group received four lessons, involving four stories of progressively greater difficulty. Thus, altogether there were 72 lessons examined in the study (6 classrooms x 3 reading groups x 4 stories). Imai et al. (1992) have analyzed the dynamics of attention during the same 72 lessons.

The difficulty of the texts was manipulated in a within-subjects design. The easiest story was one grade below nominal grade level--which is to say, a first-grade story for the second graders and a second-grade story for the third graders. The second easiest was at present grade level, the third was one grade above grade level, and the fourth was two grades above grade level. The difficulty of the stories was determined by three judges who selected stories of representative difficulty and interest from basal anthologies from first through fifth grades. The stories were chosen from basals not used in the schools participating in the study. Each story was retyped so that it was exactly 10 pages long. The mean number of words on a page was 57.9, and there were no pictures on any of the pages. Each group read one story a day for each of four days. The four stories were read in order of increasing difficulty so as not to discourage students with the most difficult texts at the beginning. As a result, however, order was confounded with text difficulty.

Procedure

The reading lessons were conducted by the regular classroom teachers, all of whom reported that oral reading was the usual format of their reading lessons. The teacher asked a student to read one page. If the student made an error, the teacher was free to choose when and how to offer feedback. After the reader read a page, the teacher asked two questions prepared by the research team. The questions dealt primarily with word analysis rather than the content of the story. This procedure was then repeated until all 10 pages had been read. Each reading group read an entire story on each day. For low groups reading difficult stories, this meant that lessons took longer than usual, sometimes longer than 30 minutes. Each lesson was videotaped by a member of the research team.

Three pages in one lesson could not be used because the videotape was not started until the fourth page of the lesson. Two pages in a lesson in different group could not be used because the reader was not a regular member of the class, which meant that no background information was available about the student.

Assessment of Reading Level

Five measures were used to assess students' level of reading comprehension and fluency. These were: (a) scaled scores on the reading comprehension subtests of the MAT, Primary 1 and Primary 2, Forms L; (b) scaled scores on the reading comprehension subtest from the Illinois Goal Assessment Program (IGAP) (Valencia, Pearson, Reeve, & Shanahan, 1988); (c) teachers' ratings of students' comprehension measured on a 6-point likert scale; (d) time in hundredths of a second to read two passages from the Gray Oral Reading Tests--Revised (Weiderholt & Bryant, 1986); and (e) time in hundredths of a second to pronounce two lists of pseudowords adapted from Stanhope and Parkin (1987) and Stanovich, Cunningham, and Feeman (1984).

These measures were used to estimate comprehension and fluency factor scores. The details of the process of estimating the factor scores can be found in Imai et al. (1992). The comprehension factor was allowed to load on the MAT, IGAP, and teacher rating measure, as well as on the measure of passage reading time. The fluency factor was allowed to load on passage reading time and pseudoword reading time. The two-factor model yielded a χ^2 of 3.28 (df = 4, p = .51, RMSR = .03). The fit was reliably better than that of a one-factor model (difference χ^2 = 33.93, df = 2, $p < .01$). Estimated factor scores for comprehension and fluency were computed by the regression method and converted to local stanines representing students' standing among all of the participants in the study. The estimated factor scores were approximately normally distributed. The correlation between comprehension and fluency scores was .76.

Scoring of Oral Reading Errors, Reactions, and Feedback

Characteristics of oral reading errors, readers' reactions to errors, and teacher feedback were coded using a scheme adapted from the FORMAS system (Hoffman & Baker, 1981). Characteristics of the student errors included both the error type and two qualitative characteristics of the error: The degree of meaning change and the degree of graphophonemic change. Four types of errors were distinguished: substitutions, nonwords, hesitations, and insertions or omissions. *Substitutions* occurred when a reader substituted one word for the target word in the text (e.g., *a* for *the*). *Nonwords* occurred when the reader uttered something in place of the target word, but the utterance was not a word; it was either a pseudoword or part of a word (e.g., instead of *brick*, the reader uttered only *br. . .*). *Hesitations* occurred when the reader failed even to start reading a word, instead pausing for at least three seconds. *Insertions* consisted of adding an extra word to the text; *omissions* consisted of deleting a word from the text. Although the FORMAS coding system distinguishes between insertions and omissions, our coding scheme made it impossible for us to make this distinction. The best we could do was allow omissions and insertions to be grouped together in a single category.

Low-meaning-change errors were defined as errors that were both syntactically and semantically appropriate to the author's intended meaning. An example is saying *in the house* instead of *in the cabin*. *High-meaning-change errors* were either syntactically or semantically inappropriate. An example is saying *in the carpet* instead of *in the cabin*.

Low-graphophonemic-change errors were errors in which, if the target word was divided roughly into three parts, two of three parts of the word appeared in the uttered error. For example, *have* was coded as graphophonemically similar to *half* because the two utterances share the *h* and the vowel sound, although the terminal phonemes are different. *High-graphophonemic-change errors* were errors with less

than two thirds of the target word reflected in the uttered error. For example, *have* shares only the *h* phoneme with *house*. The final two phonemes in the words are different. Similarly, saying *cabin* instead of *house* would be a high-graphophonemic-change error, because there are no phonemes in common between the two words.

Student reactions were classified into seven types: self-corrections, continuations, pauses, calls for help, spontaneous rereading, unsuccessful reattempts, and no chance. *Self-corrections* occurred when the reader provided the right word himself or herself, without any prompting from the teacher or from other students. *Continuations* occurred when the reader kept right on reading after making an error, either not noticing the error or ignoring it. *Pauses* referred to intervals of silence of three or more seconds following an error. *Calls for help* occurred when the reader asked the teacher for assistance in reading a word. *Spontaneous rereading* occurred when the reader went back to the beginning of the clause or sentence to try again. *Unsuccessful reattempts* referred to failed attempts at self-correction, without prompting from the teacher. The category of *no chance* was coded when the teacher or a fellow student said the correct word immediately so that the reader had no time to react to the error.

There were several measures of teacher feedback. The first measure was simply whether the teacher provided feedback to a particular error. If the teacher did provide feedback, the type of feedback was also coded. There were two basic types of teacher feedback. *Terminal feedback* consisted of telling the target word to the reader, and *sustaining feedback* covered all nonterminal feedback. Sustaining feedback represented a teacher's attempt to prompt the reader to correct his or her own error. Subcategories of sustaining feedback included telling the student to reread, calling attention to the error but offering no specific help, providing a clue that related to the meaning of the story, and providing graphophonemic feedback (feedback that related to graphic and/or phonemic properties of the word). Finally, the timing of feedback was coded. The measure coded whether feedback was offered so quickly that the reader had no chance to react to his or her own error.

Errors, reactions, and feedback were scored from the videotapes of the lessons by trained raters. The raters used specially designed computer software as an aid in scoring. For each error, the rater filled in a form displayed on the computer monitor. Employing the computer software made the necessarily tedious task of scoring more manageable, and the software contained built-in safeguards to minimize clerical errors. Nevertheless, four independent raters could reach only 72% agreement during a reliability check. This led us to review problematic categories and to reclassify many entries. Although we did not have independent raters complete another reliability check at this point, we are confident that reliability was then satisfactory.

Other Measures

Grade, gender, and the serial position of pages within stories were among the other measures. Grade was coded 2 for second grade and 3 for third grade. Girls were coded 1 and boys were coded 2. The serial position of pages was coded from 1 through 10.

There were three measures of group reading ability. The first was mean group comprehension, which was the average comprehension score of the students in a reading group. Second was mean group fluency, which was the average fluency score of the students in a reading group. And third was simply the nominal level of the group (low, middle, or high), coded as 1, 2, or 3.

We assessed text difficulty on several different measures. One was the simple grade-level measure. The easiest story read by students in each grade was given a value of 1, the second easiest story a value of 2, the next most difficult a value of 3, and the most difficult a value of 4. A second measure was the average rating of story difficulty as rated by experienced teachers. Page-by-page difficulty was assessed

with two measures, the Fry Readability Scale (Fry, 1977) and the proportion of words on a page rated as hard by experienced teachers.

For several analyses, we wanted measures of teachers' general feedback tendencies. Therefore, we computed (a) each teacher's average rate of different measures of feedback for a given group on a given story, (b) each teacher's average rate of different measures of feedback for a given group averaged across all stories, and, (c) each teacher's average rate of different measures of feedback across both groups and stories. The average rate measures were rate of giving feedback, the rate of giving immediate feedback, the rate of giving terminal feedback, and the rate of giving sustaining feedback. These measures attempt to tap a feature of oral reading lessons that may influence readers: how frequently they get different kinds of feedback. A disadvantage of these measures is that they are intercorrelated to some extent with the overall rate of errors. Groups that make more errors naturally receive a higher rate of feedback. Therefore, in all statistical analyses in which rates of feedback were used, measures of error rates were used to control statistically for this potential confounding.

Approach to Analysis

The predominant tool of statistical analysis used in this study was logistical regression analysis, specifically, the SAS/STAT program (SAS Institute, 1986). The primary motivation for using logistical regression analysis instead of ordinary least squares regression is that logistical regression allows dependent variables to be dichotomous. Almost all of our dependent variables were dichotomous, such as whether a teacher gave feedback. The output from logistical regression analysis is analogous to the output from ordinary least squares regression analyses. Instead of F values, however, the test distribution in logistical regression is a χ^2 distribution.

We used a hierarchical approach to entering variables. In most analyses, variables were entered in blocks in the following order: (a) grade; (b) individual reading comprehension and fluency and gender; (c) measures of group ability; (d) text characteristics; (e) where appropriate, characteristics of the error that was made; (f) where appropriate, the reader's reaction to the error; and (g) where appropriate, the teacher's average rate of different types of feedback with measures of overall error rates entered simultaneously as a statistical control. As a first step, models that explored all relevant relationships were examined. Then, factors that were not reliable and did not enter into reliable interactions were deleted and the analysis was rerun. The tables present models that have been reduced in this manner.

Several procedures were common to all analyses. To keep the experiment-wise likelihood of rejecting the null hypothesis when it was true within reasonable bounds, all tests of reliability of individual factors were computed using the .01 level. Because of the large number of variables, overfitting was a constant danger. To illustrate, consider what typically happened when both individual comprehension and individual fluency were entered into the equation. For nearly all the dependent variables we examined, individual comprehension was a better predictor of the dependent variable than individual fluency, so that individual comprehension entered the equation first. Then, when individual fluency entered, it entered with the sign opposite of the sign with which it would have entered had it entered first. We took this to be a mark of overfitting the equation, yielding results that are quite misleading. Hence, as a general rule, whenever a variable entered the equation with a sign opposite of the sign it would have entered at an earlier stage in the analysis, we deleted that variable from the equation.

To enter all two-way interactions would have led to an explosion in the likelihood of Type I error. As a result, for most analyses, we looked only at one set of two-way interactions, namely, the interactions of individual comprehension with other factors.

Several of the predictor variables examined in this study were highly intercorrelated, sometimes because of logical or conceptual dependencies among the variables. Colinearity poses problems of interpretation

of results. We tried to solve these problems by looking, not only at the best fitting model, but at alternate models and consistency across models.

Results

In this section, we present results on readers' errors, readers' reactions to their errors, and teacher feedback following errors. Then we describe a qualitative analysis of feedback patterns.

Readers' Errors

Altogether, readers made 3,003 oral reading errors in the 72 lessons. Table 1 presents the error rates by story for students in low, middle, and high groups in second and third grades. A regression analysis, which will not be described in detail, confirmed the expected general trends. Second graders made more errors than third graders. Students in low groups made many more errors than students in high groups, and all students made more errors on more difficult stories than on easy stories. The error rates suggest, however, that Story 3 and Story 4 may have been of roughly equal difficulty because the overall error rate for these two stories was about the same.

Somewhat unexpected was the extremely high error rate in the low groups in second grade. Obviously, one reason for the high error rate is that the students were asked to read stories above their grade level. But low-ability second graders had an 11% error rate even on the very easy story graded at first-grade level, and they had a 22% error rate on the second-grade story. These figures are higher than the error rates reported by Allington (1980) and by Hoffman et al. (1984). In Allington's study, the error rate for low-group readers, presumably reading grade-level texts, was 4%; in the study by Hoffman et al., the figure was 7.7%.

To further understand the dynamics of errors, we completed logistic regression analyses of two aspects of errors: degree of meaning change and degree of graphophonemic change. Altogether, students made 1,920 errors that could be classified as either high- or low-meaning-change errors. Of these, 59.6% were high-meaning-change errors. Table 2 shows the rate of high- and low-meaning-change errors for low, middle, and high students in second and third grades.

As Table 3 indicates, the results of the logistic regression analysis on high-meaning-change errors were quite simple. High-meaning-change errors were negatively associated with individual comprehension and with grade and positively associated with the density of hard words on each page. It is noteworthy that the density of hard words on a page was a better predictor of high-meaning-change errors than was any measure of story difficulty. No indicator of group level or teacher feedback was reliable at the .01 level.

A total of 1,839 errors could be included in the analysis of degree of graphophonemic change. Of these, 61.2% were high-graphophonemic-change errors. Table 2 shows the rate of high- and low-graphophonemic-change errors for low, middle, and high students in second and third grades. Table 3 reveals that only two variables were associated with the likelihood of making a high-graphophonemic-change error, namely grade and the individual student's reading comprehension. Again, no indicators of group context effects appeared in these equations, nor, surprisingly, did any text characteristics.

Examined next were the factors that influenced three types of errors: Substitutions, nonwords, and hesitations. Excluded from the analyses were errors in which the reader came to a word and paused very briefly, usually less than a second, and the teacher interrupted with feedback before the reader could make an attempt at the word. These errors were excluded because the readers did not have a chance to show what kind of error he or she would make. The results of the three analyses are summarized in Table 3.

Table 3 indicates that several factors influenced the likelihood of substitutions. Substitutions increased from the beginning to the end of the story and were less likely when the overall error rate for a story was high. Perhaps most intriguing, the likelihood of substitutions was greater when the teacher presented a high rate of terminal feedback.

The effect of page may have resulted from increasing familiarity with the characters and story line. As readers become more familiar with the story, they may be more likely to be able to make some guess at a word, rather than simply hesitating or uttering a nonword. The effect of the rate of terminal feedback on substitutions is probably related to the effect of the rate of terminal feedback on hesitations and will be discussed below.

As can be seen in Table 3, individual comprehension was the only factor that influenced the likelihood of nonword errors. Good readers were less likely to utter nonwords than poor readers. The relationship between individual comprehension and nonwords is easy to understand; good readers have better decoding skills and tend not to decode part of a word and then stop. No measures of story difficulty entered the equation, nor did any of the measures of group ability or rates of teacher feedback.

Table 3 shows that five factors affected hesitations. First, good readers were much less likely to hesitate than were poor readers. Second, hesitations were more likely on pages with more difficult words. Incidentally, the proportion of hard words on a page was a much better predictor of hesitations than any of the measures of general story difficulty. Third, hesitations were less likely on later pages than on earlier pages. This trend may reflect that readers became familiar with some of the hard words as the story went on. Fourth, hesitations were more likely when the rate of reading errors in the class was high; this is not unexpected, because a hesitation was coded as a type of error.

Finally, the rate of terminal feedback given by teachers to their classes was negatively related to the likelihood of hesitations. That is to say, readers in classes that received a higher rate of terminal feedback during a story were less likely to hesitate. In an alternate model that did not fit the data quite as well, rate of sustaining feedback was positively related to hesitations. Evidently, simply telling readers words they do not know keeps a group moving through a story at a faster pace than does providing sustaining feedback, but with the cost that readers make more substitution errors.

Readers' Reactions

Table 4 tabulates the various reactions made by readers to their own errors. The most common student reactions were continuations, pauses, and self-corrections. In both second and third grade, low-group readers were much more likely to pause after an error than were high-group readers. High-group readers were more likely than low-group readers to continue and to self-correct. The most prominent "reader reaction" was not a reader reaction at all; teachers frequently gave feedback so quickly that the reader had no chance to react. Second-grade teachers gave readers no chance more often than did third-grade teachers, and low-group readers were interrupted more often than high-group readers.

Table 5 displays the results of the logistic regression analysis of the likelihood of self-corrections. Notice, first, that graphophonemic change affected self-corrections: Self-corrections were more likely when there was a large graphophonemic difference between the error word and the word printed in the text. Notice, second, that whereas there were no main effects of individual comprehension or meaning change, these factors did interact reliably. This happened because meaning change influenced self-corrections, but only for good readers: Good readers were much more likely to self-correct following a high-meaning-change error than following a low-meaning-change error. Poor readers, in contrast, were no more likely to self-correct after a high-meaning-change error than after a low-meaning-change error. One interpretation of this finding is that good readers monitored the meaning of what they read more effectively than poor readers, a result fully consistent with previous research (Brown, Armbruster,

& Baker, 1986). The last reliable finding in Table 5 is the negative association between hesitations and self-corrections. It simply was uncommon for students to hesitate for three or more seconds and then produce the correct word.

We were surprised to discover that neither group level nor characteristics of teacher feedback influenced the likelihood of a self-correction. Given McNaughton & Glynn's (1981) findings on immediate feedback and rates of self-correction, we had expected to find that immediate feedback was negatively associated with self-corrections. In fact, rate of immediate feedback never approached significance once individual comprehension level entered the equation. We shall discuss possible explanations for this result in a later section.

The second reader reaction that we analyzed was continuation--that is, instances in which the student kept right on reading following an error. Table 5 displays the results of the logistic regression analysis. By far the strongest predictor of continuations was whether the error was a hesitation. As might be expected, when students hesitated, they seldom continued reading, leaving the problem word unread. Similarly, nonwords tended not to be followed by continuations. This was probably because when readers got stuck in the middle of a word, they realized that they could not continue leaving the word incomplete. (It is worth noting that had hesitations been omitted from the equation, insertions-omissions would have entered the equation with a reliable positive relation to continuations. Readers tended to ignore insertions and omissions.)

High-meaning-change errors tended not to be followed by continuations. When the error embodied high meaning change, readers probably were more likely to notice the error and so not to keep on reading. But there were more continuations during difficult stories, perhaps because neither individual nor group measures of comprehension were reliably related to continuations. Although individual comprehension entered the equation in an early step, it was unreliable in the final equation.

Finally, and significantly, Table 5 indicates that there was clear evidence for effects of the teacher's feedback on continuations. The rate of sustaining feedback in a group during a particular story was negatively related to continuations. In other words, a higher rate of sustaining feedback was associated with a lower likelihood of continuing after an error. A plausible interpretation of this finding is that sustaining feedback encourages self-monitoring (Clay, 1979, pp. 72-73).

The final reaction that we analyzed was a composite variable; we created a new variable that encompassed whether students had either called for help or paused. Each of these responses signals a tendency to rely on the teacher (or on other students) for help, so we decided to combine the two responses into a single dependent variable. In this analysis, which is summarized in Table 5, one factor that had a big effect is whether the error was a hesitation. Students who hesitated when they came to a word usually continued to pause for several seconds. Pauses and calls for help also tended to follow nonwords.

Table 5 indicates that readers were much more likely to pause following a high-meaning-change-error than a low-meaning-change error. Moreover, there was an interaction between degree of meaning change and the reader's comprehension level, which appeared because poor readers were more likely than good readers to pause or call for help after they had made a high-meaning-change error. Interpreting this interaction together with the parallel one involving substitutions, it now appears that both good and poor readers were monitoring their comprehension, but when something did not make sense, good readers were able to self-correct. In contrast, poor readers either had less control over the strategies needed for self-correction, or they were less willing to risk another attempt, so they more frequently waited or called for help.

Teachers' Feedback

As we noted earlier, a teacher must make a series of three decisions whenever a student makes an oral reading error: whether to give feedback at all, when to give feedback, and what type of feedback to give (Hoffman & Clements, 1984). Our goal in analyzing teacher feedback was to determine the factors that influenced each of these three decisions, which we hoped would allow us to understand aspects of the moment-by-moment dynamics of decision making as well as to infer the general aims that guided the decisions.

Of the 3,003 errors made in the 72 lessons, 719 (23.9%) were errors that the reader self-corrected without help or to which other students, rather than the teacher, gave feedback. This left 2,284 errors to which the teacher had an opportunity to supply feedback. Of these 2,284 errors, the teacher offered feedback 1,587 times (69.5%). And of these instances of feedback, the timing of the feedback was immediate on 1,045 occasions (65.8%) and delayed on 542 occasions (34.2%). Teachers offered terminal feedback 866 times (54.6%) and sustaining feedback 721 times (45.4%).

Three sets of logistic regression analyses were performed, one set for each of the three feedback decisions made by teachers. Because we were concerned to explain variation within individual teachers in feedback decisions, rather than between-class variation, the models presented in this paper included teacher contrast vectors to remove variation among teachers. In other words, we controlled for differences in feedback between teachers. In these analyses, we entered reaction variables first, error variables second, individual variables third, group variables fourth, and text variables last. The reason we entered reaction and error variables before the others was that we believed these variables would have the most direct impact on teachers' feedback decisions. All models presented are reduced models, with unreliable variables removed.

Whether the teacher gave feedback. The dependent measure in the first analysis was whether the teacher gave feedback of any kind. Table 6 presents the final logistic regression model. Four variables (in addition to the teacher contrasts) were reliably related to the teacher's decision to give feedback. The most powerful determinant of whether the teacher provided feedback was the reader reaction of continuation. When the reader continued reading, the teacher had a distinct tendency not to provide feedback. Similarly, insertions and omissions tended to be ignored by the teacher. Reading comprehension level was negatively associated with the decision to provide feedback; poor readers were more likely to receive feedback than good readers, other factors being equal. And teachers were more likely to give feedback on high-meaning-change errors than on low-meaning-change errors. Measures of group level did not enter the model.

Each of the six teachers' decisions on whether to provide feedback was analyzed separately and the coefficients for the various factors were found to be similar in direction and magnitude to the coefficients in the overall equation. Therefore, all of the teachers behaved consistently with the model summarized in Table 6.

Timing of feedback. The dependent variable in this analysis was whether the teacher presented feedback immediately, without giving the reader 3 seconds or more to react, or whether she gave the feedback after a delay, allowing at least 3 seconds for the reader to react. This analysis included only errors for which the teacher gave feedback.

The results of the logistic regression analysis are displayed in Table 6. Several variables were strongly related to the timing of feedback. Story difficulty was positively related to immediate feedback: There was more immediate feedback on difficult stories. Both the degree of meaning change and the degree of graphophonemic change were positively related to immediate feedback. In other words, the teachers

were more likely to offer immediate feedback following flagrant errors, when meaning change was high or when graphophonemic change was high.

Measures of individual or group ability did not enter this analysis, but there was an interaction between individual comprehension and the degree of meaning change. What this interaction indicated was that teachers were more likely to give immediate feedback to poor readers when the error was a high-meaning-change error than when the error was a low-meaning-change error. The reverse was true for good readers. With good readers, teachers were more likely to give immediate feedback after low-meaning-change errors than after high-meaning-change errors. A reasonable interpretation is that teachers were aware that good readers are usually able to catch their own high-meaning-change errors (see Table 5), so they delayed feedback to give them a chance to self-correct. But the teachers probably assumed that poor readers would not be sensitive to even big changes in meaning; thus, poor readers were less likely to be given a chance to self-correct following high-meaning-change errors.

In a subsidiary analysis, we asked the question whether error rate mediated the influence of story difficulty on the likelihood that teachers would offer immediate feedback. The answer is that it did not; entering error rate in the equation had no effect on the weight for story difficulty. Evidently, teachers adjusted the timing of feedback based on an appraisal of story difficulty rather than directly on the basis of the frequency of errors.

One important finding is the preponderance of immediate feedback. The teachers gave immediate feedback nearly 66% of the time during this study. This figure is about 10 percentage points higher than the corresponding figures reported by Allington (1984) and by Hoffman and Clements (1984). Probably the reason for the difference is that two of the four stories used in this study were more difficult than the ones typically used in second and third grade, and our results show that the frequency of immediate feedback goes up as story difficulty increases.

The model of the timing of feedback presented in Table 6, like the model of whether to give feedback described in the previous section, was stable across the six classrooms. Comparisons across classes revealed a fairly consistent pattern of coefficients from class to class. However, the teacher contrasts accounted for more variation in this model than in the model of whether the teacher gave feedback.

Sustaining versus terminal feedback. The third logistic regression analysis concerned the third teacher decision: What kind of feedback to give. The dependent variable was whether the teacher gave sustaining or terminal feedback.

The first important finding is that the six teachers varied dramatically in how much sustaining feedback they provided. Two teachers provided almost exclusively terminal feedback. Two teachers provided about half terminal and half sustaining feedback. One teacher provided about 75% sustaining feedback, and the final teacher provided very little feedback of any kind, though what she did provide was almost exclusively sustaining. (Students in her class did sometimes call out the correct word, without being asked to do so by the teacher, when the reader made an error.)

The logistic regression model for sustaining versus terminal feedback is presented in Table 6. Four variables were associated with the decision to provide sustaining feedback. Individual reading comprehension was positively related to sustaining feedback: Good readers were more likely than poor readers to receive sustaining feedback, other factors being equal. Story difficulty was negatively related to sustaining feedback: Difficult stories led to more terminal feedback. And high-meaning-change errors were more likely to receive sustaining feedback than low-meaning-change errors, and insertions and

omissions were positively associated with sustaining feedback. Once again, no measure of group ability added reliably to the amount of variance accounted for by the model.

Individual comprehension and story difficulty might affect the likelihood of sustaining feedback by affecting the frequency of errors. However, a model assuming indirect paths through error rate did not fit the data. What this suggests is that in making decisions about sustaining or terminal feedback teachers appraised the student and the story, rather than basing decisions on the actual frequency of errors.

Considering the wide range in teachers' use of sustaining feedback, this model was surprisingly stable across the six classrooms. Individual comprehension and story difficulty, in particular, had similar coefficients in five of the six classrooms.

Qualitative Analysis of Teacher Feedback

Qualitative analysis of the videotapes focused on sustaining feedback. The reason for focusing on sustaining feedback is that this is the type of feedback that both clinical experience (Clay 1979) and previous research (Anderson, Evertson, & Brophy, 1979; Hoffman et al, 1984) indicate is most likely to help students build strategies for decoding and improve as readers. The analysis was intended to illuminate the specific nature of the feedback that teachers employed. Two categories of sustaining feedback might help students, depending upon the circumstances. Feedback in the first category provides a *graphophonemic cue*--a hint about the sounds in the problem word. Feedback in the second category provides a *context cue*--a hint about the meaning of the problem word. We had intended to investigate both categories of cues, but as it turned out context cues were used so infrequently that the analysis had to be limited to graphophonemic cues.

Examined altogether were 353 episodes in 36 lessons in which the teacher responded to the student with graphophonemic feedback. Overall graphophonemic feedback was the third most common form of feedback, after terminal feedback and attending feedback (admonitions to pay attention or reread). It was not employed equally often by the six teachers in the study. The majority of graphophonemic feedback recorded was given by three of the six teachers.

For each episode, we analyzed the type of error the child made and the specific help at word identification that the teacher offered. In some cases, the episodes were extended when the student made repeated attempts to identify the unknown word and the teacher responded to each successive attempt. In extended episodes, each of the responses by the teacher was analyzed separately and coded for the type of feedback.

The teachers' graphophonemic feedback was coded according to the specific nature of the help that was offered. Most instances of feedback could be categorized as one of five types. In each type, the teacher told the student a part or successive parts of the word. The five types were:

- Supplying the initial consonant sounds;
- Describing the first vowel sound;
- Supplying the final consonant sound;
- Supplying the initial syllable;
- Saying the syllables of the word slowly.

The most striking finding of the analysis was that each teacher used a particular strategy so consistently that, instead of calling it a strategy, it might better be called a stereotyped routine. Representing each teacher's preferred feedback pattern as a percentage of this teacher's total graphophonemic feedback, Teacher A displayed her preferred pattern 68% of the time, Teacher B 86% of the time, and Teacher C 66% of the time. Teachers A and C most often described the sound of the vowel, for example:

Problem word	*Student attempt*	*Teacher feedback*
leaving	living"	"long e"
mane	"man"	"long a"

Teacher B's routine was to supply the initial sounds of the word. This routine was employed when the student said the word incorrectly as well as when the student made no attempt to say the word:

Problem word	*Student attempt*	*Teacher feedback*
noticed	"no . . ."	"nŏt . . ."
crawling	[hesitation]	"cr . . ."

The teachers' feedback routines did not appear to be contingent on the nature of the error, since they were used across a variety of error types. Examples:

Problem word	*Student attempt*	*Teacher feedback*
cleared	"cleaned"	"cl . . ."
great	"garden"	"gr . . ."
scared	[hesitation]	"sc . . ."

In addition, the same type of feedback continued to be employed even when the information it supplied was irrelevant to the source of the reader's error. In the example below, the teacher told the student the sound of the vowel although the error involved the consonants at the beginning and end of the word:

Problem word	*Student attempt*	*Teacher feedback*
snip-snip	"spin-spin"	"short i"

In summary, the qualitative analysis confirmed Spiegel and Rogers' (1980) finding that there is very little variety in the feedback teachers give. Each teacher had a routine approach to feedback that she used a majority of the time, even when it did not seem likely that it would help readers figure out problem words. In our judgment, such narrowly focused and routinized feedback is not optimum for helping children develop as readers.

Discussion

Figure 1 summarizes the network of interrelationships among oral reading errors, readers' reactions to their errors, and teachers' feedback following errors. The figure incorporates all of the factors that reliably influenced the dependent variables in each of the regression analyses. We have amused ourselves by calling Figure 1 a "pathwork quilt." That it is a pathwork quilt, instead of a path analysis, is attributable to the fact that the figure pieces together analyses involving varying subsets of the data and that, in our attempt to provide a comprehensive account of interrelationships, the model is over-specified.

In Figure 1, a plus sign represents a positive relationship, a minus sign a negative relationship, and two pluses or two minuses a strong and highly reliable relationship. The arrows mark the presumed direction of influence; however, there are instances in which the direction of influence is problematic,

and in a sociocognitive system such as the oral reading error episode, the reasonable assumption is that reciprocal influences are the rule rather than the exception.

The nature of readers' errors was influenced by many factors, including individual comprehension, grade, density of hard words, and teachers' feedback. Compared to better readers, poorer readers made more high-meaning-change errors and high-graphophonemic-change errors, and their errors were more likely to be nonwords and hesitations. High-meaning-change errors and hesitations were also more likely on pages with a high density of hard words. Teachers' feedback was associated with two categories of errors, substitutions and hesitations. Substitutions were more likely when teachers gave more terminal feedback on a story; hesitations were less likely in classes with higher classwide rates of terminal feedback.

Figure 1 indicates that readers' reactions were most consistently influenced by the nature of the preceding error. Notably, hesitations led to fewer self-corrections and continuations and more pauses and calls for help. Similarly, nonwords were associated with fewer continuations and more pauses and calls for help. Good readers made more self-corrections and displayed fewer pauses and calls for help following high-meaning-change errors, whereas the opposite was true of poor readers.

Teachers' feedback decisions were affected by individual (not group) comprehension level, story difficulty, and features of errors and readers' reactions to them. Teachers tended to let an error pass if the reader continued reading, provided more feedback to poor readers than to good readers, and corrected high-meaning-change errors more often than low-meaning-change errors. Teachers provided immediate feedback more often on difficult stories; immediate feedback was also more likely following high-meaning-change and high-graphophonemic-change errors. Generally, teachers used terminal feedback more often than sustaining feedback. However, teachers were more likely to provide more sustaining feedback when stories were easy and when errors were high-meaning-change errors; they were more likely to provide terminal feedback to poorer readers. In addition, when they provided sustaining feedback, teachers tended to rely on a single favorite type of hint.

Teachers made a different feedback decision after a high-meaning-change error depending upon whether the error had been made by a good reader or a poor reader (see Table 6). They tended to offer immediate feedback to poor readers but delayed feedback to good readers. The differential feedback of the teachers mirrored the reactions of the children: Following a high-meaning-change error, poor readers became less likely to self-correct and more likely to pause or call for help. Conversely, after a high-meaning-change error, good readers were more likely to self-correct and less likely to pause or call for help. Hence, the differential responses of teachers neatly dovetailed with the children's reactions.

How should the pattern of findings on teacher feedback be interpreted? What teacher aims would be consistent with these findings? We believe that the teachers in the study were not guided by any single goal as they offered feedback. No single goal is consistent with all of the findings in Figure 1. Rather, it appears that the teachers were juggling several different, often conflicting, goals.

Some of the relationships in Figure 1 are consistent with the hypothesis that teachers wanted to move through the lesson as quickly as possible, keeping disruptions to a minimum. This hypothesis is consistent with the strong tendency of teachers to refrain from giving feedback when readers ignored their errors and kept on reading, even when the errors resulted in high meaning change. Teachers appeared to be content to allow the lesson to move on, even at the expense of letting some high-meaning-change errors pass by uncorrected.

Further evidence for the hypothesis that the teachers were concerned with pacing comes from a parallel analysis of student attention. Imai et al. (1992) have shown, analyzing data from the same 72 lessons analyzed in this study, that the low groups were more inattentive than high groups and that an increase

in story difficulty caused a decline in students' attentiveness.[1] The strongest finding from the Imai et al. study was the precipitous decline in attention immediately following reading errors. So, with difficult stories and low groups, teachers were confronted simultaneously with a large increase in errors and an associated decrease in attention. To counter inattention, the teacher may have wanted to accelerate the feedback cycle.

A teacher can hasten the feedback cycle in two ways: by giving immediate rather than delayed feedback and by giving terminal rather than sustaining feedback. If a teacher is concerned about countering inattention by maintaining as fast a pace as possible, she would be more likely to give immediate and terminal feedback on difficult stories and to poor readers, because these are conditions that beget inattention. In fact, these are the adjustments in feedback shown in Figure 1. Teachers did give more immediate feedback on difficult stories, and when poor readers made high-meaning-change errors, teachers did increase the frequency of immediate feedback (see Table 6). Teachers did give more terminal feedback on difficult stories and to poor readers. Moreover, increasing the rates of immediate and terminal feedback and decreasing the rate of sustaining feedback did result in students producing fewer hesitations and more continuations.

The first hypothesis that seems warranted by our data, then, is that one of the goals that guides feedback decisions is the goal of maintaining the pace of the lesson. But this hypothesis alone runs into trouble accounting for some other features of the data. For example, if all the teacher wanted to do was to maximize the pace of the lessons, she could omit feedback in every instance where the reader ignored his or her own error and continued reading. But the data show that teachers did sometimes provide feedback to errors that readers ignored, especially high-meaning-change errors. Moreover, the positive relationship between high-meaning-change errors and the decision to provide feedback suggests that another of the teachers' concerns was to ensure that the publicly stated story was tolerably accurate. The teachers tended not to let flagrant errors pass without correction.

We now have two presumed aims--that teachers wanted to keep the lessons moving and that teachers wanted to ensure that the publicly stated story was reasonably accurate. But even taken together, the two hypotheses fail to account for some patterns in the data. First, these hypotheses cannot explain why some teachers did give sustaining feedback; if the only goals of feedback are to ensure that the pace is fast and that the publicly stated story is accurate, all feedback could be terminal. But all feedback was not terminal. The teacher sometimes gave sustaining feedback to poor readers even when their errors did not change the meaning of the story. As these errors did not interfere with the publicly stated meaning, why were teachers not content to let them pass uncorrected? A third hypothesis seems necessary: Teachers had the goal of helping students who were having difficulty with decoding.

We hypothesize, therefore, that as the teachers gave feedback, they were negotiating an internal compromise between three different, and often conflicting, goals. The three goals were to maintain pace of the lesson, bolster the publicly stated meaning of the story, and to help students who were having trouble decoding. In some lessons, these three goals may not have come into much conflict. But in other lessons, especially lessons in low reading groups or with difficult stories, the goals may have come into sharp conflict.

Evidence for trade-offs among goals can be seen in the negative relationship between story difficulty and sustaining feedback. When story difficulty was low, evidently teachers felt they could afford to give sustaining feedback in an effort to help students improve their decoding. However, as the stories became more difficult, maintaining pace and preserving public meaning became paramount, and apparently teachers had to forego providing much help with decoding. Some time after the study, we interviewed four of the teachers about their goals as they provided feedback. They viewed videotapes of lessons they had taught during the study and were asked to reconstruct the rationale for their feedback decisions. The teachers described their decisions in terms of the same goals that emerged in

the foregoing analysis: maintaining the pace of the lesson, preserving the meaning of the story, and helping students with decoding.

To illustrate the claims we have made about teachers balancing three sometimes competing goals, we present a transcript from a situation in which the three goals are in substantial conflict, namely, a low group reading a difficult story. A typical example in this study comes from Larry, a very weak reader in the low group of his second-grade class. Larry read very slowly, pausing before many words. The two other students in Larry's group, also boys, spent much of their time staring off into space instead of reading along.

Larry:	She took her
Teacher:	Okay, she told, she told
Larry:	She told her mother . . . there . . . wouldn't
Teacher:	w-on't, won't
Larry:	won't be . . any seeds left to . . . shake out.
Teacher:	Mm-hmm
Larry:	She told
Teacher:	Uh . . . she . . . let's look again, not she told
Larry:	She took
Teacher:	Mm-hmm
Larry:	as much time as she could. . . .
Teacher:	You know that was a
Larry:	wai . . .
Teacher:	Ah. W-A-T-C-H was a Snerky-Jerk spelling word.
Larry:	Uh, watch
Teacher:	Mm-hmm, mm-hmm
Larry:	watch
Teacher:	Now put -ing on the end of it. Watch . . .
Larry:	Watching her plants and changed
Teacher:	Uh, long a
Larry:	. . . ch
Teacher:	That's it, ch . . . long a
Larry:	cha [with a short a]
Teacher:	ch
Larry:	ay
Teacher:	ch-ay
Larry:	chase
Teacher:	yes . . . ing
Larry:	chasing
Teacher:	yes, chasing
Larry:	chasing the animals away

Larry's teacher faced a real dilemma. How should she respond to all these oral reading errors, especially given the inattention of the other two students in the group? On the one hand, the teacher had reason to be concerned about Larry's decoding. She could not even assume that Larry's low-meaning-change errors were mere performance slip-ups. For instance, the error of saying *wouldn't* instead of *won't* reveals lack of careful attention to each letter in the target word. Larry often evidenced lack of close attention to print detail, and this often led to high-meaning-change errors. For example, on this page Larry also substituted *took* for *told* and *told* for *took*. The teacher might well suspect that the error on *wouldn't* reflects the same basic lack of competence in decoding as the error on *took*.

For all these reasons, the goal of helping Larry with decoding appears to demand extensive coaching, even on low-meaning-change errors. And on this page, the teacher did provide extensive coaching. But if she had done this on every page, the lesson would have dragged on interminably, exacerbating inattention in the other members of the group. The teacher's solution was to provide mostly terminal feedback. On later pages, at the first sign of hesitation, the teacher usually told Larry the word. In this way, Larry and the teacher together read the story, kept the thread of meaning going, and completed pages fairly quickly, without too much interruption.

Thus, we believe that the feedback patterns observed in this study emerged from the teachers' attempts to balance between sometimes conflicting goals. The teachers appeared to want to keep lessons moving along as quickly as possible, while maintaining an accurate public representation of meaning. At the same time, the teachers appeared to want to help students who were having trouble decoding. The outcome of this internal negotiation depended critically on the social and cognitive context of each individual reading group. Finding a compromise between the three aims was particularly exacting on difficult stories in low groups. A frequent compromise reached by the teachers in this study involved using stereotyped feedback routines.

From the foregoing, it is apparent that this study has at least one clear immediate implication for classroom practice. Especially with poor readers, a story that is too difficult triggers a dysfunctional chain of events. Children's reading strategies break down and they start making large numbers of errors. As a result, the other children in the group become restless and inattentive. To keep the pace moving and preserve meaning, the teacher stops providing sustaining feedback, which might help the children improve their decoding strategies, and begins immediately telling children the pronunciation of problem words. The implication is this: In oral reading lessons with poor readers, the primary purpose of which is to help the children improve their decoding strategies, use stories that are easy enough; in this study, stories a grade below level were not too easy for children in low groups.

One of our hypotheses was that the oral reading error episode would be characterized by *reciprocal causation*. Specifically, because oral reading is a social activity, we expected to find evidence that teachers were influenced by students and vice versa. This hypothesis was strongly supported. As already recounted in detail, features of students' behavior, such as whether an error changed the meaning or graphophonemic form of a word or whether the student hesitated or continued reading following an error, markedly influenced teachers' feedback decisions. The influence also flowed in the other direction. For example, when teachers gave more terminal feedback, students' rate of hesitations decreased while their rate of substitutions and continuations increased.

Another hypothesis to which we subscribed was that teachers' decision making would be largely governed by features of student behavior as it unfolded moment by moment. Teachers certainly were sensitive to momentary features of student reading errors and student reactions to these errors, but this turned out not to be the whole story. There were strong influences on teacher feedback decisions from individual comprehension level and, for two of the three decisions, story difficulty. These influences remained significant after the variation attributable to rate of errors and momentary features of errors and reactions had been accounted for. What this means is that the teacher was considering the student and the story, as well as the student's behavior at a given moment, when making a feedback decision.

However, teachers did *not* appear to be considering the level of the reading group when making feedback decisions. If they had been, group level would have accounted for unique variation in one or more of the decisions. That group level was not a factor is a startling result in the light of the powerful influence of group that has appeared in a whole series of studies dating back to Weinstein (1976; see also, e.g., Anderson et al., 1991). Indeed, in the companion study involving the same lessons as the present study, Imai et al. (1992) found that group level had a very strong influence on the likelihood that

children would become inattentive. Evidently, decisions about feedback are primarily an individual matter whereas attention is sensitive to aspects of group culture.

The most general purpose of the present study was to distinguish between several formulations of the oral reading error episode. According to one formulation, the behavior of students and teachers can be construed as *situated actions* that hinge on the dynamic interplay of factors that converge at particular moments. According to an alternate formulation, behavior is governed by a *script* that is enacted again and again in the same way regardless of situational factors. Taken all together, the data clearly support the situated action theory. Readers' errors and reactions were contingent upon such situational factors as the difficulty of texts and teachers' feedback patterns. Teachers' behavior was contingent on the reading level of the children, the difficulty of the stories, the nature of the errors, and the children's reactions following errors. However, for several teachers, once the decision to give sustaining feedback had been made, their sustaining feedback was not very sensitive to the particular errors made by readers: For these teachers, this one aspect of the oral reading error episode appeared to be governed by a script.

Although the data support a situated action formulation, they do not support a version of situated action theory that might be termed *radical contextualism*, the champions of which sometimes talk as though no generalizations across situations are tenable. Although there were certainly differences between classrooms in this study, the behavior of teachers and students during oral reading episodes proved to be highly predictable, and certain features of the behavior proved to be stereotyped. Figure 1 may be considered to present a complex picture of the oral reading error episode, but it does represent generalizations across people and situations that were replicated rather well in the six classrooms in this study and that are generally consistent with the findings from previous studies.

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Footnote

[1]In the Imai, Anderson, Wilkinson, & Yi (1992) study, attention during oral reading was defined operationally as looking at the page. Thus, inattention does not imply misbehavior or disruptive activity; it simply means that nonreaders were not reading along on their own stories. Our videotapes show that inattentive students were almost never disruptive in any way beyond not paying attention.

Table 1

Rate of Errors Per 100 Words by Grade, Reading Group, and Story Difficulty

Grade	Grade Level of Story	Reading Group		
		Low	Middle	High
Grade 2	First	11.0	4.5	1.6
	Second	22.0	7.1	2.4
	Third	27.5	9.3	3.8
	Fourth	23.4	9.6	3.6
Grade 3	Second	4.9	2.8	1.9
	Third	7.6	3.8	3.1
	Fourth	9.3	3.7	3.0
	Fifth	8.0	4.5	3.9

Table 2

Rate of High- and Low-Meaning-Change Errors and High- and Low-Graphophonemic-Change Errors Per 100 Words Within Grade and Reading Group

		Reading Group		
Grade	Type of Error	Low	Middle	High
Grade 2	High Meaning Change	8.28	3.31	1.09
	Low Meaning Change	2.50	2.51	1.15
Grade 3	High Meaning Change	2.61	1.51	1.05
	Low Meaning Change	2.24	1.70	1.77
Grade 2	High Graphophonemic Change	8.17	3.30	1.15
	Low Graphophonemic Change	3.57	1.78	0.86
Grade 3	High Graphophonemic Change	2.49	1.42	1.01
	Low Graphophonemic Change	2.14	1.50	1.14

Table 3

Logistic Regression Analyses of Characteristics of Errors

	Type of Error									
	High Meaning Change		High Grapho-phonemic Change		Substitutions		Nonwords		Hesitations	
Variable	b	χ^2	b	χ^2	b	χ^2	b	χ^2	b	χ^2
Grade	-.41	14.30**	-.48	17.98**	...	...	...	...	...	...
Individual comprehension	-.24	86.64**	-.09	13.95**	.06	4.11*	-.33	49.69**	-.32	100.44**
Density of hard words	5.68	11.76**	...	...	...	...	...	...	6.67	12.54**
Page	...	...	...	...	.06	16.24**	...	...	0.05	7.03*
Rate of errors in story	...	...	...	...	-5.70	32.22**	...	...	18.89	33.39**
Rate of terminal feedback in story	...	...	...	...	5.14	14.44**	...	...	-12.91	7.64*
Intercept	2.01	14.30**	1.90	59.70**	.83	15.48**	-2.11	272.93**	-2.09	46.54**

** $p < .001$
* $p < .01$

Table 4

Rate of Reactions per 100 Words (% in Parentheses) by Reading Group Within Grade

	Reading Group							
	Low		Middle		High		TOTAL	
Reaction	Rate	(%)	Rate	(%)	Rate	(%)	Rate	(%)
Grade 2:								
No chance	12.34	(56.9)	2.93	(37.2)	0.94	(31.7)	5.41	(49.8)
Continuation	2.35	(10.8)	2.71	(34.3)	1.04	(34.9)	2.03	(18.7)
Call for help	0.54	(2.5)	0.05	(0.6)	0.02	(0.5)	0.61	(1.9)
Pause	4.05	(18.7)	0.85	(10.8)	0.26	(8.6)	1.72	(15.8)
Unsuccessful reattempt	1.12	(5.2)	0.24	(3.0)	0.05	(1.6)	0.47	(4.3)
Reread	0.02	(0.1)	0.05	(0.6)	0.03	(1.1)	0.03	(0.3)
Self-correct	1.28	(5.9)	1.06	(13.4)	0.64	(21.5)	0.99	(9.1)
Grade 3:								
No chance	3.55	(47.5)	0.66	(17.7)	0.47	(15.6)	4.68	(32.9)
Continuation	2.21	(29.6)	1.85	(49.6)	1.70	(56.6)	5.76	(40.6)
Call for help	0.07	(1.0)	0.04	(1.2)	0.00	(0.0)	0.03	(0.8)
Pause	0.40	(5.3)	0.19	(5.1)	0.04	(1.5)	0.21	(4.4)
Unsuccessful reattempt	0.23	(3.1)	0.13	(3.5)	0.04	(1.5)	0.13	(2.9)
Reread	0.07	(1.0)	0.00	(0.0)	0.01	(0.5)	0.03	(0.6)
Self-correct	0.94	(12.5)	0.85	(22.8)	0.73	(24.4)	10.61	(17.8)

Table 5

Logistic Regression Analyses of Self-Corrections, Continuations, and Pauses/Calls for Help

	Self-corrections		Continuations		Pauses/Calls for Help	
Variable	b	χ^2	b	χ^2	b	χ^2
Individual comprehension	.07	6.21	...	...	-.18	9.74*
Story difficulty	...	...	.24	18.78**	...	...
Meaning change	-.25	2.12	-.44	49.44**	2.65	26.16**
Graphophonemic change	.31	15.89**	...	...	...	...
Individual comprehension x Meaning change	.11	8.86*	...	...	-.36	11.14**
Hesitations	-.77	17.14**	-40.24#	...	5.49	187.66**
Nonwords	...	...	-3.99	15.10*	2.86	24.06**
Rate of errors in story	...	...	6.73	25.69**	...	...
Rate of sustaining feedback in story	...	...	-13.17	25.43**	...	...
Intercept	-1.55	104.49**	-.59	14.15**	-3.75	68.37**

**$p < .001$
* $p < .01$
# This parameter is estimated to be infinite by the logistic regression algorithm.

Table 6

Logistic Regression Analysis of Whether Teacher Provided Feedback, Whether Teacher Provided Immediate (vs. Delayed) Feedback, and Whether Teacher Provided Sustaining (vs. Terminal) Feedback

	Whether Feedback		Whether Immediate Feedback		Whether Sustaining Feedback	
Variable	b	χ^2	b	χ^2	b	χ^2
Between-Class Contrasts		12.01**		66.54**		656.22**
Within-Class Variables:						
Individual Comprehension	-.12	7.00*	.06	2.78	.26	34.94**
Story Difficulty	...	...	.26	21.30**	-.45	43.36**
Meaning Change	.73	57.02**	.86	38.07**	.48	23.62**
Graphophonemic Change	...	...	.29	14.42**	...	...
Individual comprehension x meaning change	...	...	-.14	12.36**	...	...
Continuation	-4.25	575.26**	...	...	...	...
Insertion or Omission	-1.19	12.38**	...	...	1.74	7.71*
Intercept	3.24	261.82**	-.64	8.80*	-.08	.08

**$p < .001$
* $p < .01$

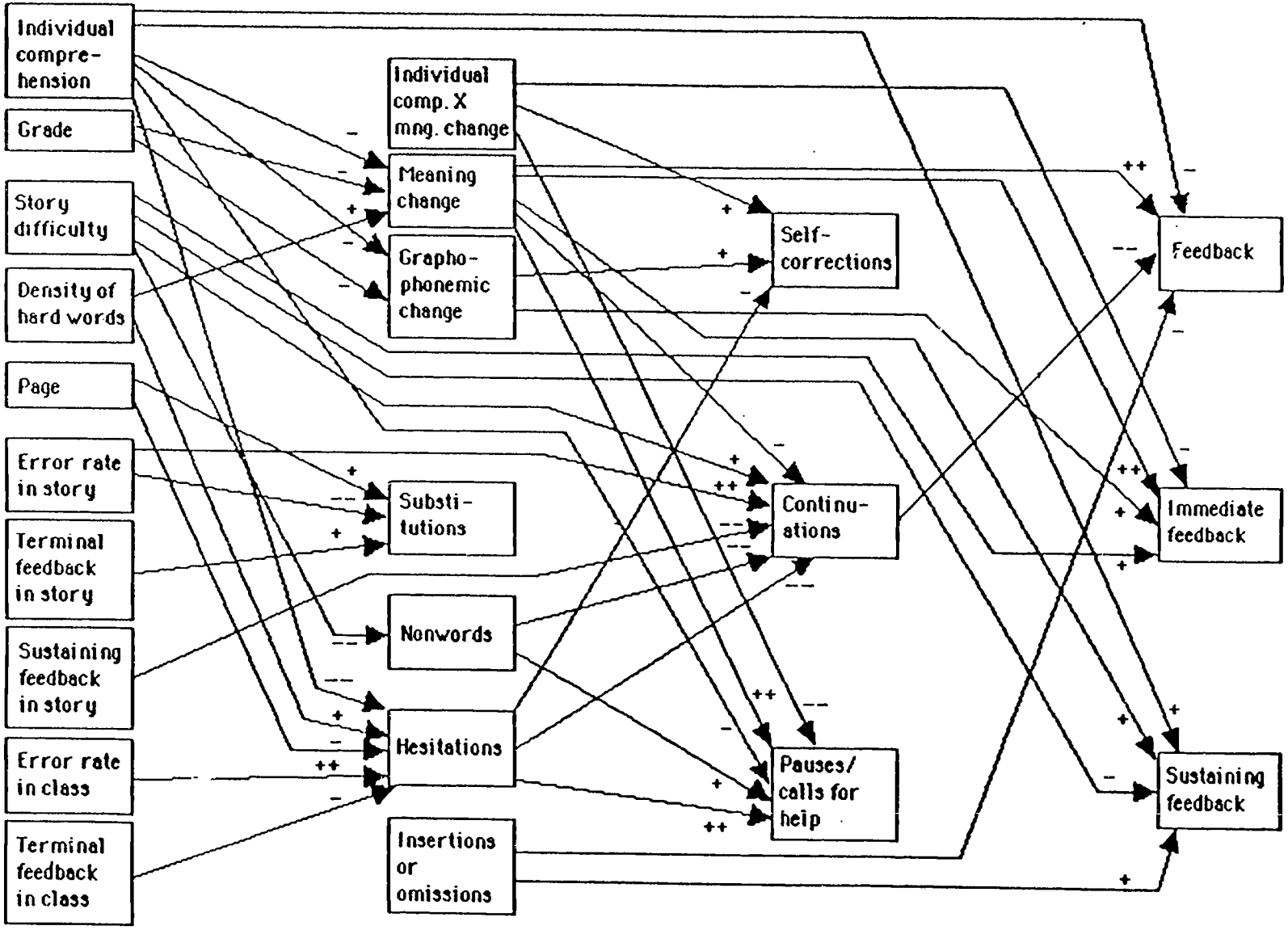

Figure 1 Network of relations among errors, reactions, and feedback