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ABSTRACT

Research has established that classroom verbal interaction typically involves turn taking cycles described as "teacher solicits," "pupil responds," and "teacher reacts." A study examined the question/answer cycles occurring within 36 videotaped language arts lessons conducted by six elementary school teachers and made inferences regarding what students must know about repeated cycles of turn-taking during classroom discourse in order to comprehend discussion. The study was confined to three main sequences: (1) the topical or independent relationship, in which two adjacent question cycles are structurally separate, but frequently related by topic; (2) the conjunctive relationship, in which two or more question cycles are tied together because the same question is asked of more than one pupil; and (3) the embedded relationship, in which one question cycle is contained within another because the teacher reaction involves a new solicitation. Graphic displays of the taped lessons suggested that the structural sequencing of question cycles varied a great deal from lesson to lesson, and that much of this variation was derived from the instructional strategy or teaching procedure being used. Comprehension of a conjunctive cycle appeared to depend on a pupil not only realizing that the same question was being asked more than once, but also understanding why the question was being repeated. Comprehension in an embedded cycle appeared to depend on the pupil recognizing that the teacher's reaction did not close out the matter at hand, but that the topic was being pursued further. (HOD)

Cycling and Recycling Questions: The "When" of Talking in Classrooms

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Background

This paper uses data from one segment of a two-year socio-linguistic study of lesson discourse in six elementary school classrooms. Details of the completed investigation are contained in a comprehensive six-part report to the National Institute of Education. One of the major findings serves to set the stage for the focus of this paper:

> We conclude on the basis of these data, that for these teachers and pupils, the critical variables (among those studied here) in relation to final reading achievement are entering reading and participation in class discussions... In relation to our investigative interest in pupil perceptions of the rules of classroom discourse, pupil participation in class discussion can be viewed as the behavioral evidence of pupil understanding of the rules of discourse.
> (Morine-Dershimer, Galluzzo and Fagal, 1980; p. 94)

Considerable research accumulating over the past 15 years has established that verbal interaction in classrooms typically follows repeating "turn taking" cycles Bellack (1966) described as "teacher solicits, pupil responds, teacher reacts". The present body of data is no exception. In three of the thirty-six videotaped lessons studied, children were specifically requested to ask questions, certainly atypical regarding who is carrying out the solicitation moves, and additionally unusual is that no "react" phases appear ---

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This paper examines the question/answer cycles occurring within 36 videotaped Language Arts lessons conducted by six elementary school teachers at one school on the outskirts of San Jose, California. From the patterns identified and their variations, inferences are made regarding the understanding of discourse rules needed in order for pupils in this setting regularly to comprehend discussion.

Analyzing Question Cycle Sequences

We noted (as have others) that many question/answer cycles seem to fit together into larger units or sequences. Among our data there are many long passages in which the same question is asked of several students before a new solicitation is used. There are numerous examples of short cycles which appear to be included within larger cycles. We drew on the recent work of Mary Candice Johnson (1979) to assist in analyzing the cyclical syntax of discourse in the 36 lessons under study. Johnson's system of cycle categories seemed to offer special assistance in plotting and analyzing discourse sequences consisting of seemingly related cycles of the type appearing often among our data.

We have adapted and simplified Johnson's system for discourse analysis and diagramming. Where she identifies structuring moves that often precede cycles, and distinguishes many subcategories within moves and cycles, we have confined our study to three main types of cycles and related sequences. Johnson defines these three types of cycles in terms of structural relationships.

The "topical", or "independent", relationship is one in which two adjacent question cycles are structurally separate, though frequently related by topic. The first cycle is closed out with a reacting move, and a new cycle is begun with a solicitation addressed

the children do not comment on the teachers' responses. The remaining thirty-three lessons exhibit the repeating cycles found by Bellack and many others. There are a few instances, under half-a-dozen, in which a teacher gives no discernable reaction to a pupil answer, leaving an incomplete cycle, and there are sporatic isolated solicitations by pupils. In the main, however, there are over 1200 cycles initiated by a teacher with a question or other solicitation, followed by a pupil answer, and ending with the teacher reacting in some fashion to the answer.

Since understanding the regularities of classroom discourse appears in the larger investigation to be highly related to achievement (at least in reading), and since the major syntactical regularity of the examined discourse is the solicit/respond/react cycle, it seems promising to investigate further the nature of repeated cycles and to find out what students must know about them in order to comprehend discussion. We are particularly interested in whether cycle syntax poses any difficulties that successful participants solve but that unsuccessful participants might not be able to surmount. For example, are there subtle variations in cycle usage which occur from lesson to lesson for the same teacher, or even within the same lesson, that are potentially confusing? Do cycle patterns change from teacher to teacher, requiring different understandings as pupils progress through the grades and encounter a different teacher each year? Do cycle patterns alter as the year progresses, requiring a different understanding of syntax mid-year, let us say, in contrast to the beginning of school in the Fall?

to a new pupil. An example of this type of relationship is:

	Teacher E:	On page 106 is a poem that we're going to read and discuss this morning. What is the title of the poem? Ellen?
Solicit		
Respond	Ellen:	Antonio.
React	Teacher E:	Antonio
		And the person who wrote this poem is who? Herman?
Solicit		
Respond	Herman:	By Laura E. Richards.
React	Teacher E:	By Laura E. Richards. OK.

The "conjunctive" relationship is one in which two or more question cycles are tied together because the same question is asked of more than one pupil. Johnson defines this as occurring when a question is unanswered, or answered incompletely or incorrectly. We have found that this relationship also occurs when divergent questions are asked, and a variety of correct responses are given. An example of this type of relationship is:

	Solicit	Teacher D:	What is a sentence? Julie?
	Respond	Julie:	It's a little story.
	React	Teacher D:	It's a little story. OK. (nods at James)
(same Q)	Respond	James:	It tells you something.
	React	Teacher D:	James says it tells us something. A little story that tells us something. Cheryl.
(same Q)	Respond	Cheryl:	It's a little story that starts with a capital letter and ends with a period.
	React	Teacher D:	Starts with a capital and ends with a period. What are the three things we need to make a good sentence, then?
	Solicit		Mark.

The "embedded" relationship is one in which one question cycle is contained within another, because the react move involves a new solicitation, as in the case of a probing question, or a question of clarification. An example of this type of relationship is:

Solicit	Teacher F:	Has anyone here ever accidentally swallowed anything? John?
Respond	John:	Dirt.
React (Solicit)	Teacher F:	How did you do that?
(Respond)	John:	Climbing up a hill on my motorcycle and I hit a rock and uh ... the front wheel popped up and I turned around so the bike wouldn't fall, but it fell on me and my head hit the dirt, and I ate some dirt.
(React)	Teacher F:	Your face told me how you liked the taste of that. (laughter)

In diagramming lessons, we have displayed each of the three cycle types in a different manner. A series of "topical" or independent question cycles are displayed in a vertical sequence, as below:

1
2
3

A series of "conjuctive" cycles are displayed in a horizontal sequence, as follows:

1 2 3 4

An embedded cycle is shown as a subscript. Thus, a single probing question occurring in reaction to one response in a conjunctive series would be diagrammed this way:

$1\ 2\ 3_1\ 4$

A series of three probing questions occurring in reaction to a response in a non-conjunctive cycle (each probe would begin a new embedded cycle) would be displayed in the following manner:

1
2_3
3

To illustrate the procedure further, we present a brief interactive sequence which includes all three types of question cycles, and display our diagram of that sequence

Discourse sample:

	Solicit	Teacher D:	Can you give me some nouns that are people? Michael.
	Respond	Michael:	Presidents.
	React	Teacher D:	Presidents are persons.
(same Q)	Respond	Robert:	Butchers.
	React	Teacher D:	A butcher is a person.
(same Q)	Respond	Mark:	Directors.
	React	Teacher D:	A director is a person.
	(Solicit)		What do they do?
	(Respond)	Mark:	They direct movies.
	(React)	Teacher D:	OK, movie directors.
(same Q)	Respond	Gavino:	Parents.
	React	Teacher D:	Parents are persons.
(same Q)	Respond	Chris:	Ancestors.
	React	Teacher D:	Ancestors are persons. Would most of them be living or dead?
	(Solicit)		
	(Respond)	Chris:	Dead.
	(React)	Teacher D:	They would be dead, huh? Judy.
(same Q)	Respond	Judy:	Sisters.
	React	Teacher D:	Sisters are persons. Very good.
	Solicit		Now, can you remember what a noun is? Let's do it again.
	Respond	Pupils:	A noun is a person, place, or thing.
	React	Teacher D:	Very good. That was a very good review.

Diagram:

$1\ 2\ 3_1\ 4\ 5_1\ 6$

2

In this sequence, then, a series of six conjunctive (horizontal) question cycles occurred, and two of these contained embedded (subscript) cycles within them. This conjunctive series was followed by a new, structurally independent, or "topically" related cycle (vertical). We have attempted to make the diagrams which

display these relationships quite simple in design, so that the "bare bones" of the lesson structure stand out. The sequence of the question cycles, for purposes of reading the diagram, moves from left to right and from top to bottom.

The Lessons in Graphic Form

The structural diagrams for each of the thirty-six lessons are presented in Figures 1 - 6, with the six lessons for a given teacher all included in a single figure. The reader is thus presented with a graphic display of the lessons themselves, from which (s)he may form some hypotheses or generalization in addition to the conclusions that we will present.

An underlining of a question cycle indicates that it was initiated by a pupil, rather than by the teacher (i.e., a pupil asked the question that began the cycle). Where a series of embedded cycles occurred, and some of these were initiated by the teacher while others were initiated by pupils, the number of lines indicates how many were initiated by pupils (e.g., a question cycle which included six embedded cycles within it, three of which were questions initiated by pupils, would be diagrammed thus: $\underline{\underline{\underline{6}}}$).

The topic of each lesson is noted above the diagram. In several instances the teachers used specific instructional strategies, or "models" (Joyce and Weil, 1972), which they had learned in connection with a Teacher Corps project. Where a specific model or strategy was used, this is noted. Where textbooks were the primary source of materials and questions for discussion, this is noted. If a lesson utilized a special activity other than discussion, this is noted.

FIGURE 1

Structural Sequencing of Question Cycles
In Lessons Taught By
Teacher A

Early September
Topic: Scrambled Sentences

1
2 2
3_2
4
5
6
7 2 3
8_1
9
10
11
12 2 3 4
13
14
15 2
16_1 2
17 2 3 4

Late September
Topic: Reading a Story About Foods We Like

1
2 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
3
4 2 3
5
6
7

October
Topic: Reading Stories About Cats, Written By Pupil

1_3
2 2 3 4_3
3
4
5
6
7
8
9
10
11
12
13
14
15 2 3 4 5 6 7 8_2
16
17
18
19
20

November
Topic: Practicing the Thanksgiving Play

1
2
3
4
5
6
7
8
9
10
11 2 3 4
12 2 3
13
14
15
16
17
18
19
20
21
22 2 3 4_2
23
24
25
26_2

December
Topic: "Sharing Time"

1_1 2 3_2 4_8 5_2
2
3_3 2_2
4
5_4 2_2 3_1

January
Topic: The Story of Abraham Lincoln

1
2 2 3 4 5 6 7 8 9 10_3 11 12 13 14 15_5 16
3
4
5
6
7
8
9
10
11
12
13_3
14

FIGURE 2

Structural Sequencing of Question Cycles
In Lessons Taught By
Teacher B

Early September
Topic: Capitalizing Names
(Concept Attainment Model)

1
2 2
3
4
5
6
7 2 3
8
9
10
11
12$_1$ 2 3 4 5$_1$
13
14
15
16 2 3
17
18
19

Late September
Topic: Feelings
(Synetics Model, Personal Analogy)

1
2 2 3
3 2
4 2 3 4 5 6 7
5 2 3 4
6 2 3
7 2$_1$ 3 4
8 2 3
9 2$_1$ 3 4
10 2$_1$ 3 4 5 6
11 2 3 4

October
Topic: Categorizing Concrete Object
(Concept Formation Model)

1
2
3 2
4
5 2
6
7
8 2$_3$ 3$_1$
9
10
11
12$_1$ 2
13$_1$
14
15 2 3
16
17
18
19
20
21
22$_1$
23
24

November
Topic: Describing Thanksgiving Food
(Synectics Model, Direct Analogy)

1 2 3
2
3 2 3
4 2$_1$ 3$_1$
5 2 3
6
7
8
9 2$_1$
10
11
12
13
14 2 3$_1$ 4 5 6
15 2 3 4 5$_1$ 6 7
16
17
18 2 3 4
19

December
Topic: Asking Good Questions
(Inquiry Training Model)

1
2
3
4
5
6
7
8
9
10
11
12
13
14 2
15
16
17
18
19
20
21
22
23
24$_1$
25
26$_1$
27$_1$
28$_1$
29
30
31
32$_3$
33
34$_1$
35$_5$
36
37
38
39
40
41 2$_1$
42$_4$
43

January
Topic: Origins of Names

1$_4$
2$_1$
3 2$_3$
4 2 3$_2$ 4$_6$
5 2$_3$ 3 4 5$_1$
6$_1$ 2 3$_1$ 4$_1$ 5$_1$
7
8$_1$ 2 3 4

FIGURE 3

Structural Sequencing of Question Cycles
In Lessons Taught By
Teacher C

Early September
Topic How Animals Communicate
(Textbook Lesson)

1
2
3
4
5
6_1
7 2 3 4
8
9
10
11
12
13 2 3 4
14
15_1 2 3_1 4 5 6 7
16
17 2 3_2
18
19
20 2
21
22
23
24
25_2
26
27
28
29
30
31_2
32
33_2
34
35

Late September
Topic Interpreting Signs
(Textbook Lesson)

1
2
3
4 2 3 4 5
5 2
6_3
7_1
8 2 3 4_1
9
10
11
12
13
14_1 2
15_2
16
17_1
18_2
19
20 2
21_1

October
Topic Making Comparisons
(Synectics Model, Direct Analogy)

1_1 2 3 4
2 2 3 4 5 6 7
3 2 3 4 5 6 7_1 8
4 2 3
5_1 2 3 4 5
6 2 3_1 4 5
7 2 3
8 2 3
9
10
11
12
13 2 3 4
14

November
Topic Asking Good Questions
(Inquiry Training Model)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17 2
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33

December
Topic: "Interference" in Communication
(Textbook Lesson)

1
2 2_1 3 4 5 6
3
4
5
6
7_3
8 2 3 4 5
9
10 2
11 2 3
12
13_2
14_1
15_4
16_6

January
Topic: Nouns
(Textbook Lesson)

1
2
3 2
4 2 3
5 2_1 3_1
6
7 2
8
9
10_1
11 2_1
12_1
13 2 3
14
15_1
16_1
17_1
18_2
19 2 3 4 5_1

FIGURE 4

Structural Sequencing of Question Cycles
In Lessons Taught By
Teacher D

Early September
Topic: Compound Words
(Concept Attainment Model)

1
2
3
4
5
6
7_1
8_1
9
10
11
12
13_1
14 2 3 4
15
16 2_3
17 2 3
18 2_2 3 4_1 5
19
20_1

Late September
Topic: Action Words
(Activity is Pantomime)

1 2 3
2 2 3
3
4
5
6_3
7_2
8
9_1 2_1 3_1 4_2
10_1 2_4
11
12
13 2
14
15
16 2 3 4
17
18
19_1 2
20
21
22_1
23
24

October
Topic: Description Words
(Activity is Drawing A Witch)

1
2
3
4 2_1
5_1 2_2
6
7 2_4 3_2
8
9_3 2
10
11
12
13
14_1
15

November
Topic: Describing Things
(Sensory Awareness Model)

1
2 2 3 4 5 6 7 8
3
4
5
6
7
8
9_1
10
11
12
13
14_1
15_1
16
17
18_1 2 3
19

December
Topic: Building Mental Pictures

1
2 2 3 4 5 6_1 7_1 8 9 10 11 12 13 14 15 16 17 18
3
4
5
6 2 3 4 5_1 6_1 7 8 9 10_1 11_1 12_1 13 14_1 15_1 16

January
Topic: Nouns

1
2
3 2 3 4 5 6 7 8 9 10 11
4
5_1
6
7
8_1
9
10
11_1
12_1
13
14
15 2_1 3 4 5 6_1 7_1 8 9_1 10_1 11 12_1 13
16 2 3 4 5 6 7 8 9_4
17 2 3 4 5 6 7_1 8 9 10_1 11 12 13 14

FIGURE 5

Structural Sequencing of Question Cycles
In Lessons Taught By
Teacher E

Early September
Topic: Word Order and Sentence Meaning (Textbook Lesson)

1
2 2
3
4
5
6 2
7
8_2
9
10_3
11
12_1
13_1
14_1
15
16_2
17
18
19
20 2
21_1 2
22
23
24

Late September
Topic: Choral Reading (Textbook Lesson)

1
2_1
3
4
5 2 3
6_1
7_1
8_1
9 2 3 4_1
10
11
12
13 2
14_1
15 2
16
17
18
19 2 3 4 5_1 6
20
21

October
Topic: Preparation for Creative Writing on "The Haunted House"

1 2_1 3 4 5 6 7
2
3 2
4
5
6
7 2 3 4 5 6
8 2 3
9
10
11
12

November
Topic: Reading Comic Strips Written By Pupil Groups

1
2 2
3
4_1
5
6
7
8
9
10
11_2
12
13
14
15 2
16

December
Topic: Poetry Interpretation (Textbook Lesson)

1 2_3
2
3
4
5 2 3 4 5
6 2 3 4 5 6 7 8 9 10_1
7
8 2_3
9_1 2 3_1 4 5 6 7
10
11 2 3_1 4 5 6 7 8 9 10_2 11 12 13
12 2_1 3 4_1 5_1 6 7

January
Topic: Poetry Interpretation (Textbook Lesson)

1
2
3
4 2 3 4 5
5
6
7
8
9
10
11
12
13_4
14
15_2
16
17
18_1 2
19_4
20_2

FIGURE 6

Structural Sequencing of Question Cycles
In Lessons Taught By
Teacher F

Early September
Topic: Word Order and Sentence Meaning (Textbook Lesson)

1
2 2
3
4
5_1 2_2
6
7
8
9
10
11_3
12
13
14_4
15
16 2
17
18
19_1
20
21
22
23_1
24

Late September
Topic: Communicating By Pantomime (Textbook Lesson)

1
2
3 2 3
4 2_1 3_2 4_1
5
6
7 2_1
8 2 3 4 5_1 6
9
10_2
11
12 2_1
13
14
15_1
16
17_2
18

October
Topic: Reporting Embarrassing Experience

1_1
2
3
4_2 2_1 3_1 4_1
5
6_1 2 3
7
8 2

November
Topic: Transforming Statements to Commands (Textbook Lesson)

1 2_1 3_1 4
2_1
3 2 3 4
4
5 2
6
7
8
9
10 2 3 4
11
12
13 2 3 4
14
15
16
17
18
19
20
21
22
23
24 2 3 4
25 2 3

December
Topic: Describing Feelings (Personal Analogy)

1
2
3
4_4
5
6_1 2 3
7
8
9_1 2 3_1
10_2
11 2 3 4
12
13 2 3
14
15 2 3 4
16 2
17 2 3 4_2 5 6 7_1

January
Topic: Compound Words (Textbook Lesson)

1
2
3
4
5
6_1 2 3_2 4
7
8
9
10_3
11
12_1
13
14
15
16
17
18 2 3 4 5 6 7 8 9
19_1 2_1 3 4_1 5
20
21_1 2_1 3_1 4_1 5 6 7 8 9_1

What stands out immediately on these graphic displays of lesson structures is that each teacher shows some variations in structure from one lesson to the next, and that some teachers show marked variation between lessons (e.g., compare the November, December, and January lessons of Teacher A, in Figure 1, or the December and January lessons of Teacher B, in Figure 2). There are other interesting aspects of these diagrams that may not be so immediately obvious.

Consider the lessons taught in early September by Teachers E (Figure 5) and F (Figure 6). These happened to be two lessons dealing with exactly the same page of the same textbook, though taught by two different teachers to two different classes on two different days. Note the similarity in the structure of these two lessons. Now compare these to other "textbook lessons." (See Figures 3, 5, and 6; in each figure, four lessons are designated as textbook lessons.) In all but one case, these lessons tend to be more vertical than horizontal in structure, with several instances of conjunctive sequences which are short to moderate in length. The single exception to this general pattern is Teacher E's December lesson (Figure 5), where many students were invited to interpret a poem presented in the textbook by giving their own opinions and ideas about the problem raised in the poem.

If textbook lessons appear to have a somewhat distinctive structural sequencing of question cycles, this is even more true of "model" lessons. Consider, for example, the two "inquiry training" lessons (Teacher B in December, Figure 2; Teacher C in November, Figure 3). These lessons stand out because they are

almost entirely vertical in structure, and because a large number of question cycles are initiated by pupils. This lesson strategy involves having students ask questions that gradually zero in to identify critical variables that may serve to explain a "puzzling situation" introduced by the teacher. Thus, the lesson structure displayed in these two instances appears to be appropriate to the model. In contrast to these two lessons are three which follow a "synectics" model (Teacher B in late September and in November, Figure 2; Teacher C in October, Figure 3). These lessons show much more horizontal, or conjunctive, development in relation to vertical development. The "Synectics Model" involves pupils in analogical reasoning, asking them to make comparisons between two rather dissimilar things as a way of developing creative thinking. Since divergent responses are desirable, it is appropriate to have several students respond to any given question. This pattern of question cycling is clearly evident in the diagrams for these three lessons.

The impression derived from studying these graphic displays of the lessons, then, is that the structural sequencing of question cycles can vary a great deal from lesson to lesson, and that much of this variation may derive from the instructional strategy, or teaching procedure, being used. As a descriptive device, the structural diagram appears to reflect some important similarities and differences between lessons.

Measures of Conjunctive and Embedded Development

The data contained in the lesson diagrams can be used to quantify certain aspects of the lesson structure. We have developed

two different measures for this purpose. The measure of conjunctive development of the lesson is calculated as follows:

$$\left(\frac{\text{Number of Questions Which Initiate a Conjunctive Series}}{\text{Number of Questions Contained in the Vertical Sequence}}\right) \text{ Average Number of Questions in a Conjunctive Sequence}$$

This measure is designed to give some quantification of the degree to which questions are developed "horizontally", by giving several pupils an opportunity to respond to the same question.

The measure of embedded development of the lesson is calculated in a similar way, as follows:

$$\left(\frac{\text{Number of Question Cycles Which Include an Embedded Cycle Within Them}}{\text{Total Number of Question Cycles in Lesson, (Including Conjunctive Cycles)}}\right) \text{ Average Number of Embedded Cycles Within a "Main" Question}$$

This measure is designed to quantify the degree to which pupil responses are developed, expanded, or refined through use of probing questions.

These measures are presented for each lesson, organized by teacher and time, in Table 1. Friedman's analysis of variance by ranks shows no significant differences among teachers on either of these measures, but there are significant differences over time for conjunctive development ($p. < .05$) and differences that approach significance for embedded development ($p < .10$). In each case the December and January lessons tend to be ranked highest, suggesting that questions may tend to be pursued in somewhat more depth in the middle of the school year than they are at the beginning, or that teachers tend to use more lessons in mid-year than earlier which require more elaborate cycle development.

It is also worth noting that measures of conjunctive development are quite similar for lessons based on similar instructional strategies. For example, the two textbook lessons on word order and sentence meaning show conjunctive development measures of .334 (Teacher E in early September) and .250 (Teacher F in early September). The two inquiry training lessons show measures of .094 (Teacher B in December) and .060 (Teacher C in November). Conjunctive development in the three synectics lessons was calculated at 3.636, 1.633 (Teacher B in late September and November), and 3.003 (Teacher C in October). These measures, therefore, confirm the impression derived from the pictorial display, that the question cycle structure of lessons may be related to the instructional strategy being used.

Table 1

A Comparison of Lessons
in Terms of Structural Characteristics
(Organized by Teacher and Time)

Measures of Conjunctive Development

	Teacher A	Teacher B	Teacher C	Teacher D	Teacher E	Teacher F
Early September	.999	.686	.572	.700	1.334	.250
Late September	2.860	3.636	.814	.835	.809	.945
October	.600	.499	3.003	.601	1.499	1.125
November	.423	1.633	.060	.578	.250	1.000
December	1.998	.094	1.000	5.661	3.830	1.523
January	1.136	2.500	1.052	2.761	.350	1.283

Ranks for Times by Teacher: $x_r^2 = 11.849$, df = 5; $p < .05$

Measures of Embedded Development

	Teacher A	Teacher B	Teacher C	Teacher D	Teacher E	Teacher F
Early September	.146	.070	.220	.329	.393	.440
Late September	.000	.070	.375	.459	.210	.399
October	.267	.224	.090	.700	.040	.503
November	.118	.120	.000	.140	.165	.070
December	2.078	.462	.594	.240	.301	.342
January	.367	1.082	.341	.278	.520	.338

Ranks for Times by Teacher: $x_r^2 = 9.398$; df = 5; $p < .10$

Cycle Meaning Variations

In her data Mary Candice Johnson found variations in the meanings conveyed by both embedded and conjunctive cycles. We also found such variations. These seemed to involve signaling by the teacher regarding the appropriateness or correctness of a pupil response. Here are two examples of embedded cycles, both by the same teacher. In the first the teacher indicates that the answer is inadequate, in the second, that the answer is appropriate (it is good enough to be explained).

(1) Teacher: Can you think of some good words that can describe that turkey? When is turkey good? When it tastes how, Kevin?
Kevin: Uh --- good?
Teacher: But, how is it good? Good is too general. That doesn't tell me what you mean by good.
Kevin: Juicy.
Teacher: Great.

(2) Teacher: Rachael, would you like to explain how you grouped yours (wooden rods)? What did you do?
Rachael: I put them in shapes together.
Teacher: What do you mean, you put them in shapes together? Would you like to explain a little more?
Rachael: I put the long ones with the long ones and I put the red ones with the small ones.
Teacher: Oh, so you kind of grouped them two ways, by color and by size.

Here are two more examples of solicitations used to begin an embedded cycle, each used by a different teacher. The first conveys that something in the immediately preceding response is incorrect or questionable. The second, that the immediately preceding answer was appropriate --- good or interesting enough to ask more about it.

(3) Teacher: How would a dog tell you that he was hungry?
Jesus: He'd go to the plates or he'd lick you.
Teacher: But if he licked you, would you know he was hungry?

(4) Teacher: OK. That's a way to solve it. Who else has ever accidentally swallowed anything? John?
John: Dirt.
Teacher: How did you do that?

Here are three lesson samples using conjunctive cycles. In the first two (5) (6), the use of the cycles indicates that the answer to a preceding solicitation was inadequate or not correct; in sample (7), the conjunctive cycles assist in conveying the answers given were appropriate.

(5) Teacher: You're going to write your story, and how are you going to know your story is finished? How are you going to know when to stop? Dina?
Dina: Period.
Teacher: How are you going to know when the story is finished? When are you going to know when it's time to stop? Bridgette?
Bridgette: When you get to the bottom of the lines?
Teacher: No. How are you going to know when your story is finished? ....

(6) Teacher: ... Who knows what we're making for our fam--- for our mothers?
Ricardo: Uh---
Teacher: What are we making --- Raheem?
Raheem: A scarey witch.
Teacher: We're making a scarey witch...

(7) Teacher: ...Where would you put yours, Mikie? (advertising signs)
Mikie: All over.
Teacher: All over. Where would you put yours? Enrique?
Enrique: Uh --- in the store.
Teacher: In the store? A lot of people go to the store. I guess they would see it there. Gina?
Gina: Downtown.
Teacher: OK. Downtown. Where would you put yours, Jerry?
Jerry: In a telephone booth.

Here is a lesson sequence which includes two conjunctive cycles, each initiated by the same question. The first follows an incorrect answer; the second, the correct answer.

(8) Teacher: Why is it important that we put our words in the right order? Who can tell me? Giao?
Giao: So it can rhyme?
Teacher: Why is it important that we put our words in the right order? Why Mario?
Mario: So it makes sense.
Teacher: Let me ask that question again and see how many people know the answer. Why is it important that we put our words in the right order? Oh, good! Lots of people know this time. Would you tell us, Ricardo?
Ricardo: To make sense.
Teacher: So the words make sense.

Variations in the meaning conveyed in identical or nearly identical cycle syntax appear in at least one lesson for each teacher. They tend to "bunch" into particular lessons; Teacher B, for example, had as many as eight in one lesson, and none in several others. For Teacher D and F, however, form/meaning variations were extremely rare. Compared to the others, conjunctive and embedded cycles conveyed consistent meanings in their lessons.

There is no way to know with certainty from the current data whether variations in cycle meaning are sources of confusion for children. It seems reasonable to assume, however, that pupils who are consistently successful at deriving learning related meaning from discussion are not misled by these variations. Since, in this setting, low achievers in reading tend to show other evidence that they do not understand the underlying regularities of classroom discourse as well as their classmates (see the beginning of this paper), it is equally as reasonable to suspect that cycle/meaning variations are indeed potential sources of confusion for them.

Other Cycle Variations

Two other types of cycle event with the potential for misunderstanding warrant mention. The first is the use of answer-repeats by the teacher: the teacher repeats the pupil's response as the initial part of the react move:

(9) Teacher: OK. In the morning when you get up, what are all the things you do? What's one of the things that you do? Something you do, Mike?
Mike: Eat breakfast.
Teacher: You eat breakfast. OK. What do you do, Steven?
Steven: Get dressed.
Teacher: You get dressed.

Among the present data, the use of repeats is very frequent --- in fact there are two lessons in which every pupil response is repeated by the teacher, and several more in which almost every response is so treated. Potential confusion for pupils who have trouble "tracking the flow" of discourse, may come from the fact that repeats as used by some of the teachers convey as many as four distinctly different meanings: (a) simple acknowledgement that an answer has been given; (b) definite indication that an answer is correct or appropriate; (c) definite indication that an answer is incorrect or inappropriate (usually but not always given with rising/question intonation); (d) the teacher is asking the pupil whether she (the teacher) has correctly heard the response (always given with rising/question intonation, meaning, "Is that what you said?").

The second additional type of potentially confusing event involves what appears to be an incongruity between a teacher solicitation and a teacher reaction within the same cycle. Many times among the data teachers ask questions for which there are many

possible appropriate answers (such as the question in sample 9): "In the morning when you get up, what are all the things you do"?), or questions soliciting a pupil's personal or "inner" experiences (e.g., "Can you think of anything that has happened to you where you felt silly or embarrassed by it?"). Usually pupil responses to such questions are met with teacher react moves conveying simple acknowledgement that an answer was given, or that the answer was appropriate in type to the question asked(conveying "Yes, that's the kind of answer to give). At times, however, the teacher react move would contain a substantial indication that the particular answer given was an especially "good" one, or was, in fact, incorrect. In these cases, the nature of the react move is difficult to predict from the surface meaning conveyed by the solicitation, and the meaning of the whole cycle (or a sequence of several cycles) is obscurred. Presumably any pupil's answer to the type of question asked which is appropriate in kind is as "correct" or as "good" as any other pupil's answer; and, presumably, the pupil knows more about his/her own personal experiences than the teacher does. However, these assumptions are sometimes contradicted by teacher reactions like the ones in the following sequences:

(10)
Teacher:	When did you figure it out? That my rule was, "all names begin with capital letters". Do you remember when?
Cassandra:	After you wrote "Don".
Teacher:	Oh, that was pretty quick. Kevin, when did you figure it out?
Kevin:	When you wrote "Tom".
Teacher:	Oh, but I asked you a question somewhere down here, didn't I, and you didn't quite get it, so I think it was a little further down, wasn't it? I think you got it when I wrote "Roger".

(11) Teacher: All right, let's pretend that you are a cup. How would you look, Jesus?
Jesus: Light colors.
Teacher: Light colored. OK. How would you look, Lori? (no answer) How would you look, uh ---
Rachael: Round.
Teacher: Huh?
Rachael: Round.
Teacher: Round. All right. How would you feel if you were a cup? Um, Stacey?
Stacey: Wet.
Teacher: Beg pardon?
Stacey: Wet.
Teacher: Oh, that's a good word.

Incongruities between the solicit move and react move of the same cycle appear more frequently in the lessons of some teachers (A, B, C and E) than others (D and F). It is our impression that this type of event occurred most often in lessons which appeared to have several levels of learning objectives: a surface objective to carry out a particular task (e.g., explain a puzzling situation) and at least one underlying objective having to do with children acquiring or perfecting a process (e.g., learning internally to survey potentially critical variables and general related "yes/no" questions). Our hunch at present is that such lessons can present dilemmas for teachers in which react moves can be directed toward either the surface or underlying objective(s). We suspect that when the react move is directed to an underlying objective while the solicit move refers to a surface objective, potential for pupil confusion is generated. The matter appears worthy of further study. Additional investigation could prove of value to teachers who are attempting to learn and apply various lesson "models" in their teaching.

Summary

The structural sequencing of question cycles can vary

considerably from lesson to lesson. Much of the variation may derive from the instructional strategy being used. As the school year progresses, teachers may tend to conduct lessons that involve more elaborate cycle development than earlier in the year. At times, identical or near identical syntax --- cycle forms --- appear to express different meanings; at times the same or highly similar messages appear to be conveyed by different cycle syntax. At times incongruities appear between the solicit and react moves of the same cycle.

Discussion and Implications

Strategies of instruction. The basic system of analysis used in this study appears to be potentially productive for use in other investigations. It provides a graphic display of the sequential structure of question cycling in lessons, as well as permitting quantification of the degrees of "conjunctive development" and "embedded development" contained in the lesson. In its application in this study, the system did not provide evidence of systematic differences among teachers, but it did show significant differences over time. The structural diagrams appear to reflect similarities and differences in lessons that relate to teachers' use of particular instructional strategies.

In this study, the numbers of lessons following a given strategy or model were too small to permit a test of significance, but this is a good question for future investigation. Of related interest is whether differences in teacher intentions and objectives are reflected in differences in the degree of conjunctive and embedded development in lessons. For example, would lessons conducted with the same basal reader story show more elaborate

conjunctive and/or embedded development if the teacher intended to have pupils focus on contextual clues to "unlocking" the meaning of new words, or primarily on graphemic-phonetic relationships in the pursuit of meaning? Would different types of cycle elaboration be seen among lessons designed to teach the same mathematical procedure, such as adding fractions with unlike denominators, where the teacher intends for one lesson that the pupils follow a presented algorithm; intends for another that pupils extend what they already know about fraction equivalencies and adding fractions with like denominators; or intends, in yet another lesson, that pupils discover a way (or several ways) to carry out the procedure with the help of a set of plastic fraction pieces? We are further intrigued by the question of whether differences in teacher beliefs about learning and pupil capabilities are reflected in contrasting patterns of either embedded or conjunctive cycles as these appear over many lessons.

Variations in cycle meaning. Many of the questions above can also be raised in regard to the varying ways in which both conjunctive and embedded cycles appear to function in lessons. We suspect that complex interactions among lesson objectives, teacher perceptions of pupil capabilities, and pupil answers, control the use of such syntax variations as an embedded cycle conveying a correct answer in one situation and an incorrect answer in another, and the several ways in which repeats of pupil answers are employed.

We are impressed by the complexity of cycle variations revealed in the data. To understand classroom discourse with regularity it would appear that pupils must derive meaning from a variety of cycle sequences and form/function combinations. To do this they must use

methods for integrating information contained in a shifting array of syntax alternatives. We suspect that a pupil proficient in deriving meaning from classroom discourse, like a proficient reader, has not only internalized more syntax variations than his/her classmates, but employs an essentially different strategy to integrate information from a variety of sources and bring meaning to what he/she hears. We suspect these sources include the teacher's voice intonations, facial expressions, and body posture; previous knowledge of how this teacher operates, and a sensitivity to lesson type and to phases within lessons. We suspect the strategy involves some kind of continuous and persistent covert self-monitoring of whether he or she is "on the right track".

This paper began with the question of what it is about repeated cycles of turn-taking during classroom discourse that students must know in order to comprehend discussion. As originally asked, the question focused on syntax --- regularities in the order of teacher solicitations, pupil responses, and teacher reactions. The diagramming and analysis of conjunctive and embedded classroom discussion cycles, as carried out in this study, essentially focused on the syntactical development of lessons, on variations in the ordering of forms (moves) involving solicitations that are carried through several successive cycles, and solicitations that are part of the react move of an immediately preceding cycle. In the case of the former (a conjunctive cycle) comprehension of the discourse would appear to depend on a pupil not only realizing that the same question is being asked more than once, but also on the pupil having an understanding of why the question is being repeated, especially in situations where several pupils actually give responses. In the

case of an embedded cycle, comprehension of the discussion would appear to depend on the pupil recognizing that the teacher's react move does not "close out" the matter at hand, that something is incomplete and/or that a topic is being pursued further. Variations in the meanings conveyed by identical and near identical syntax, such as conjunctive cycles appearing after inappropriate as well as appropriate answers seem to complicate the matter of understanding the function or meaning of such cycles in the context of larger sequences. In the settings studied, familiarity with syntax forms and order does not appear sufficient for consistent understanding of classroom discourse. The fact that some pupils with regularity surmount the potential difficulties inherent in the variety and complexity of discourse syntax, suggests that they are using information from sources in addition to syntax to make sense out of what they are hearing, and employing an overall strategy which integrates the information and progressively reduces ambiguity.

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