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THE UNIVERSITY OF ALBERTA

AN INVESTIGATION OF SOME ASPECTS OF CLASSROOM  
COMMUNICATION

BY



IAN DOUGLAS WESTBURY

A DISSERTATION

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES  
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## ABSTRACT

It was assumed in the initial development of this study that it was possible to conceptualize teaching in terms of two distinct and separate dimensions: one, a programming dimension defined as the amount of control which is exercised in the classroom by the teacher and the second, a mental process dimension, defined as the mental process characteristic of communication in the classroom and described simply (in Bloom's terms) as "higher" or "lower". The study was directed towards the development of instruments which could code and describe these hypothesized dimensions of teaching and then towards the exploratory testing of the reliability of the instruments when defined as the stability of a teacher's behavior between a sequence of periods within one class and between different classes.

Two instruments were developed and then used to code tape recordings collected in thirty-six social studies classes taught by three teachers in a Western Canadian high school. Each of the three was observed in three classes ranging from grades X to XII. The tapes were first scored using a modification of the Amidon-Hunter interaction system and then again using an instrument, called the Force Systems developed in the first part of the study as a means of exploring mental process. This instrument used J.L. Austin's concept of the illocutionary force of an utterance, that is,

its communication intent, as a basis for classification;

The earlier chapters of the study report the development of, and the rationale for both the selection of the Amidon-Hunter instrument and of the Force instrument. Both can be scored from tapes of classroom periods and follow, in their general method, the conventions and approach of the Flanders' Interaction Analysis system. Both preserve some of the sequence of classroom events and are amenable to the Darwin Markov analysis developed for the Flanders' system. Inter-rater reliabilities were calculated using the Darwin method and, in all cases, satisfactory indices of intersubjectivity were obtained.

The second phase of the study attempted an initial use of these instruments in an examination of the constancy of communication behavior of the three teachers between periods within one class and between the three classes taught. The Darwin analysis was used to test the hypothesis that there was no difference between the summary transition matrices making up the set that was analyzed. This hypothesis was rejected. Further records were kept and analyzed descriptively to draw attention to the wide range of possible teaching methods and behaviors that the teachers observed might and did use. The range of behaviors observed far exceeded the number of periods sampled and it was concluded that this wide and diversified underlying domain of possible behaviors might account for the failure of the statistical

test to establish any significant statistical stability.

This hypothesis developed in the course of the study was tentatively explored using quasi-factor analytic techniques. A quasi-factor analysis was undertaken of the summing rows of the transition matrices developed in the course of coding the data accumulated in the observational phase of the study. The combined matrices were rotated to the varimax criterion and the following quasi-factors defining phenomenal clusters were obtained. 1. Question-answer (or recitation) behavior; 2. A student questioning behavior; 3. A teacher lecturing behavior; 4. A teacher controlling behavior; 5. A discussion behavior; 6. A student talk behavior. These factors were interpreted as demonstrations of the tentative validity of the hypothesis of a wide range of possible teaching behaviors. In addition the definition of the factors in terms of items from both of the analytical instruments used suggested that both instruments reflected the same aspects of a teacher's communication and that this was best interpreted by using the terms of the Austin illocutionary force. This conclusion suggested that the initial presupposition that the two instruments reflected different aspects of a simple underlying dimension of classroom communication was wrong and that more attention needs to be given to the underlying dimensions of communication.

These conclusions imply that further studies of teacher classroom behavior need to pay more attention than is

usual to the concept of reliability defined as stability between situations, persons or occasions. Specific attention needs to be paid to the question of definition of reliability in the context of interaction studies and statistical procedures which can give some insight into the empirical problem the concept raises need to be both developed and more extensively implied.

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## CHAPTER I - INTRODUCTION

Most discussion of teaching and teaching methods is couched not in terms of what teachers do but in the data-free language of what teachers ought to do. Instruction, the process of teaching, has been curiously ignored as a phenomenon and has only rarely been incorporated, as a component in any sketch of crucial variables, in, say, a prolegomenon to a curriculum research or into texts on methods or schooling. The result is, as Wallen and Travers point out in their chapter in the Handbook of Research on Teaching, there has been very little research into instruction and, as the corollary, little direct evidence that suggests that one way of doing something should be favoured, because of empirical evidence, over another way.<sup>1</sup> Any debate has been about the "ought" rather than the "is" and research has traditionally had its starting-point in preconceptions about methods that stem from preconceptions about education. Teaching, in this view, is all too often assimilated into education so that the two terms become, not altogether happily, synonymous with the consequence that teaching is subjected to theoretical rather

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<sup>1</sup> Norman E. Wallen and Robert M.W. Travers, "Analysis and Investigation of Teaching Methods", N.L. Gage, editor, Handbook of Research on Teaching (Chicago: Rand, McNally, 1963), p. 484. See Ch. 10, passim.

than methodological and empirical concern. The result is symbolized in the Wallen and Travers' chapter; there is no objective set of terms and no language that can be used to discuss teaching and no body of verifiable or verified conclusions that can be used to guide behavior or practice.

This failure to understand, or even have, basic information about the processes of teaching extends further than would seem possible after the half century of research reviewed in the Handbook of Research on Teaching. The point can be illustrated easily: there is no chapter in the Handbook itself which can be construed as a substantial review of the variables within the instructional process as such. Gage's chapter in the Handbook explored programmatically some of the causes of this failure; he distinguished two different preoccupations within a tradition of research into teaching, one he later termed "modelling the master teacher", an attempt to find the characteristic behaviors and personality and knowledge characteristics of the expert and talented teacher in a search for better selection devices, the other he termed "mastering the teaching model", an attempt to find the elements of teaching qua teaching as a basis for training and research.<sup>2</sup> The "modelling the master teacher" approach has been the dominating paradigm within teaching research; it is an approach which can slide easily and simply

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<sup>2</sup> N.L. Gage, "Paradigms for Research on Teaching" in Gage, Handbook.

, into normative and data-free prescription.

There is another aspect of Gage's distinction represented in the literature. The first paradigm or set of assumptions about goals for research and discussion has directed attention to teachers rather than teaching. This older approach is represented by the Teacher Characteristics Study; this project was concerned with the identification of broad patterns of classroom behavior and the development of paper-and-pencil instruments for handling these sweeping notions.<sup>3</sup> The second paradigm leads to a concern for the recording and controlling of almost microscopic units of classroom behavior as distinct from the gross categorization of broad spectra of behavior. The intent of this work is the improvement of the mechanics of teaching: as two of the workers in this second and newer school write

If the teacher is to be helped in stimulating the children in his class to think and in providing them with models through his own use of language, he needs to become sensitive to the nature of the demands he makes, the ways in which children respond to these demands, and the ways in which he may direct this verbal interaction more skilfully.  
 . . . It hardly need be emphasized that the

---

<sup>3</sup> David G. Ryans, Characteristics of Teachers (Washington, D.C.: American Council on Education, 1960), passim. See Donald Medley and Harold Mitzel, "Measuring Classroom Behavior by Systematic Observation," in Gage, Handbook, pp. 251-53 for a criticism of the methods of the Teacher Characteristics Study.

primary and ultimate purpose of such work is to sharpen our insight and appreciation, so that it will be possible to develop improved means of helping teachers with their daily tasks.<sup>4</sup>

The second approach is the concern of this study.

### THE PROBLEM

The problem at the heart of the study, and of all work in this area is to devise a language that can be used to describe the elements of the teaching act and then to use the set of terms that derive from the language to establish the fundamental principles and categories on which future work must be built.

Inevitably, of course, this task does not start from scratch. There is a close link between the techniques and conclusions of the margins of the older research and this study so that, in part at least, methods and approaches can flow from the work in the older tradition. And the shift in purpose was implicit in the general problem which lay at the heart of the older tradition so that Ryans, to take one example, can move from the focus of the Teacher Characteristics Study to a study of teaching; he writes of

How to cut the complex picture of instruction down to size so as to actually research it, and to understand and explain it, how to determine the appropriate sub-systems, how to measure the

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<sup>4</sup> G.A. Nuthall and P.J. Lawrence, Thinking in the Classroom (Wellington: New Zealand Council for Educational Research, 1965), pp. 2-3.

transmission and the receipt-storage-retrieval of complex information such as that involved in formal education . . . A number of suggestions are accumulating in the literature. Leads and clues regarding measurement should come from extensions of the methods of content analysis, from techniques such as those employed by Bloom for the study of thought processes, from classroom feedback investigations.<sup>5</sup>

Content analysis is the method used in this investigation.

In general terms there are two broad and complementary approaches that can be used to slice the complex phenomenon of instruction into its components. One approach, laboratory-type study, involves the construction or isolation of theoretically-derived elements and then the systematic manipulation of these elements in a controlled experimental context.<sup>6</sup> The other approach, the content analysis suggested by Ryans, attempts to explore systematically, using either exhaustive or selective category systems, instructional behavior in situ without interfering with any of the elements of the instructional situations. The study of teaching through controlled classroom observation has, of course, a

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<sup>5</sup> David G. Ryans, An Information-System Approach to Theory of Instruction with Special Reference to the Teacher, paper presented to the Annual Meeting of A.E.R.A., 1963. (System Development Corporation, Santa Monica, Calif., processed), p. 6.

<sup>6</sup> For an example of this approach in another context see Joseph D. Matarazzo and Arthur N. Weins, "Interviewer Influence on Durations of Interviewer Silence," Journal of Experimental Research in Personality, II (1967).

long history and is one obvious way of approaching the second goal.<sup>7</sup> Laboratory-type studies, on the other hand, such as those reported by Matarazzo and Weins<sup>8</sup> are not widely found as yet in educational research.

These approaches share one basic problem. In both cases a set of categories, with the implication that categories should be related to some underlying conception of the speech act and its effects, must be constructed to inform the analysis. Both approaches need answers to questions such as: How should teaching be conceived of? What categories can be used and what distinctions can be made to reduce the "teaching" of manageable proportions?

These basic questions lie at the heart of this study. Formulated in terms of content analysis rather than experimental manipulation they read:

1. What are the terms that must be used to describe the interaction of a teacher and a class of students?
2. If such terms can be isolated, is it possible to find objective correlates of the terms in the behavior of teachers and, therefore, in the phenomenon of teaching?

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<sup>7</sup> See Medley and Mitzel, "Measuring Classroom Behavior" in Gage, Handbook, passim.

<sup>8</sup> Matarazzo and Weins, op. cit., p. 56.

3. Assuming this, is it possible to construct content analysis instruments which reflect and can be used in practice to explore classroom behavior?

#### CONTENT ANALYSIS

In spite of the long tradition of controlled classroom observation, the methods and approach that underlies this research are best reviewed in the context of content analysis, for although this field is only analogous to classroom observation, it is better established conceptually and a review of the approach of the content analyst highlights some of the difficulties and some of the assumptions of the classroom observer.

In studying the classroom an observer is subject to the analyst's restriction; he is limited to the "messages" spontaneously produced by the individuals in the classroom. Usually he is not in a position to manipulate experimentally either the teacher or the students. As a compensation however, the analyst has a wealth of potential data, more indeed than can be realistically captured and analysed. The use that can be made of this mass of data, that may include gesture and inflection as well as talk, is only limited - for all practical purposes - by the devices available for recording and the coding ingenuity of the observer.

Any study begins with the assumption that all of the events which occur in the messages that are intercepted are



dependent, in some way, upon events or states in the individuals who produce the messages. The effects of the messages can be related in the same way to the characteristics of the receivers, who may in their turn, vary as widely as may the senders in the conventions for decoding and for encoding verbal and non-verbal messages. Any conclusions made about the effects or the causes of the recorded messages may only be made in the light of reasonable inferences about the characteristics of receivers and senders. This system, set out in the terms of content analysis is illustrated in Figure 1.

If no data is collected for the encoding and decoding conventions of the participants in a message situation (and there is none in this study) conclusions about the messages in, let us say, classroom talk and behavior, the motives, or the effects of these messages on either teachers or students cannot be drawn, although, in the long run, both the content analyst and the classroom observer share a common interest in making predictions or inferences between components of the messages they record and observe and states or processes in the individuals who produce or receive the messages.<sup>9</sup>

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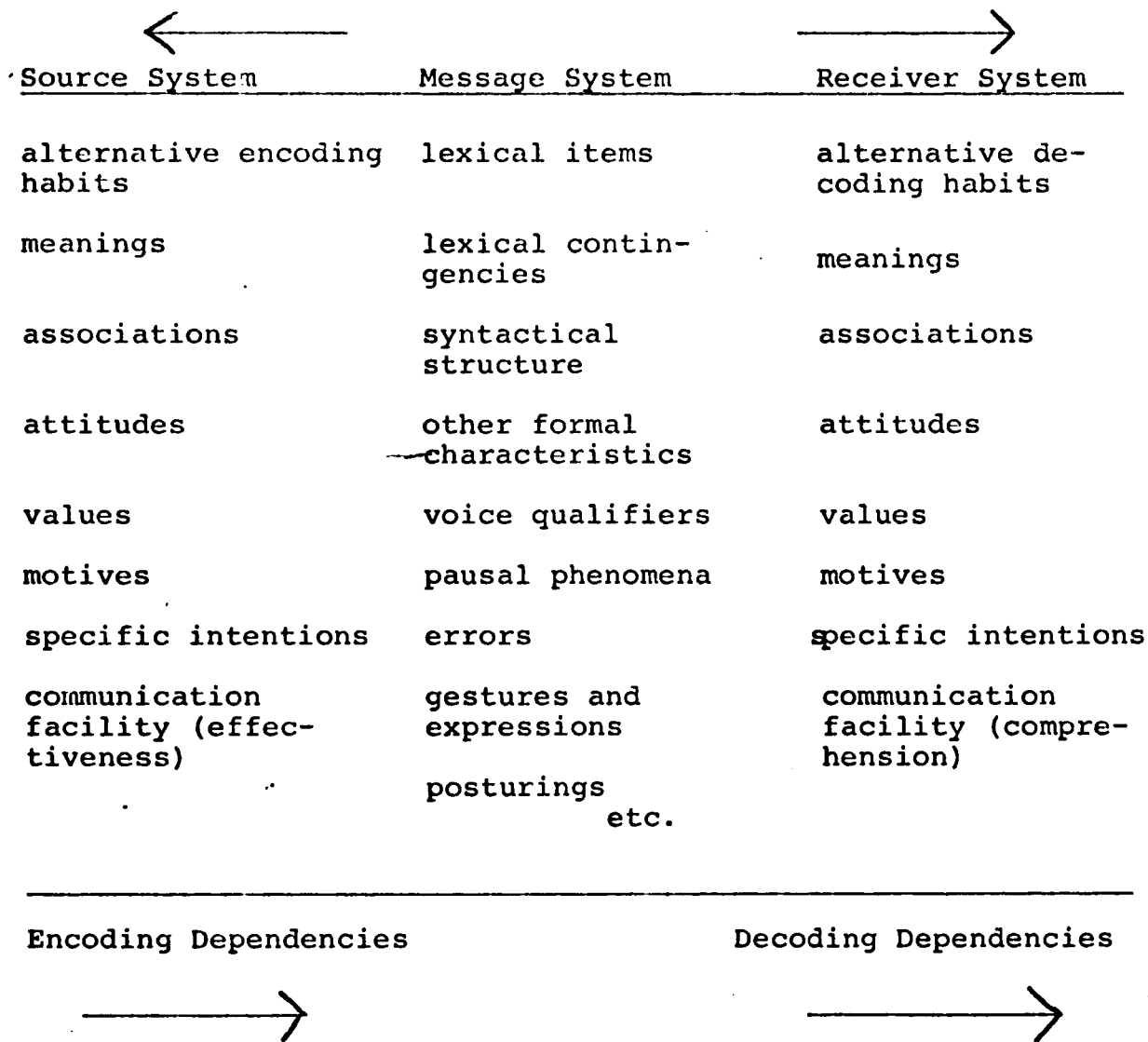
<sup>9</sup> For a reference to an observational study concerned with encoding conventions see Bruce Joyce, Howard Lamb and Joan Sibol, "Conceptual Development and Information-Processing: A Study of Teachers", The Journal of Educational Research, LIX, 5, 1966, p. 219.

FIGURE 1

THE SENDER-RECEIVER SYSTEM\*

INFERENCES ABOUT SOURCE

INFERENCES ABOUT RECEIVER



\* See Charles E. Osgood, "The Representational Model and Relevant Research Methods", in Ithiel de Sola Pool, Trends in Content Analysis, (Urbana: University of Illinois Press, 1959), p. 35.

This concern cannot be avoided. Any class of indicators selected for recording and analysis (and the range is almost infinite) must, in any long run, betray the particular and general preoccupations of the observer; yet direct involvement in the short run can be avoided, as it was in this study, by a refusal to search for correlations or inferential relations between messages and message producers and receivers. Feasibility and convenience required that this limitation be accepted in this study.

#### HYPOTHETICAL DIMENSIONS OF CLASSROOM COMMUNICATION

Osgood, in a discussion of content analysis, suggested that the number of states of individuals in message situations that one might want to make inferences about are "as infinite as the classificatory ingenuity of all members of the A.P.A. put together"<sup>10</sup> and, as he points out, the number of events or components of messages that one might want to explore is only marginally smaller. To this point educational researchers working in the tradition of systematic observation have been concerned, in the main, with some aspect or other of the components of "classroom climate," a reflection of dominating ideas about desirable classroom organization and interaction. As Medley and Mitzel point out,

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<sup>10</sup> Osgood, op. cit., p. 36.

the dimensions of classroom behavior that have come out from this work do reflect "what are probably the most obvious differences among classes . . . To measure these reliably was relatively easy; to measure more subtle and crucial differences . . . will probably be more difficult."<sup>11</sup> They go on to point out that the major dimension missing from the work conducted in the classroom climate tradition is lesson "content", yet this is perhaps the most crucial educational variable.

In planning this study it was assumed that it would be useful to explore three different levels of analysis of the classroom interaction and behavior of teachers and students.

1. GROUP AND INDIVIDUAL INTERACTION: in a discussion of the classroom behavior of a group of elementary school teachers Philip Jackson makes an important distinction between a teacher's behavior in interaction with the class group in the conventional lesson-giving situation and behavior when a class is working on some individual activity and the teacher interacts intensively with individuals in a one to one relationship. In group interaction the teacher's stance is impersonal, he is oriented to management of the group and preoccupied with the rapid and, in a sense,

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<sup>11</sup> Medley and Mitzel, "Measuring Classroom Behavior" in Gage, Handbook, p. 286.

uncontrollable ebb and flow of class events. When the teacher interacts with individuals, on the other hand, the relationship between teacher and student is characterised by affect and intensity and the teacher has much more opportunity to show himself, his interests and his warmth. Most interaction instruments and systems have ignored any discussion of individual interaction; but as Jackson points out the qualitative differences that are "worthy of more attention than they have received to date from educational researchers."<sup>12</sup>

2. MENTAL PROCESS AND PROGRAMMING: Ginther's Three Dimensional Model for Analysing Instruction, a powerful paradigmatic conceptualization of formal group interaction makes a distinction between two dimensions of instructional communication:

(i) the level of "mental process" in the talk of teachers and students and

(ii) the freedom which students are granted to initiate activities and ideas not suggested by the teacher, or conversely, the type of control which the teacher exercises

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<sup>12</sup> Philip W. Jackson, "The Way Teaching Is," National Education Association, Association for Supervision and Curriculum Development and the Center for the Study of Instruction, The Way Teaching Is (Washington, D.C.: National Education Association, 1966), pp. 17-19.

in the classroom.<sup>13</sup>

This model, which grew out of Ginther's association with the programmed instruction movement, has proved useful both in generating research into the instructional process and in providing a set of analytical categories for critical review of programmed instruction research. In addition the model has been used to generate theoretically-derived teaching situations which have been used to produce powerful experimental effects. In short, the Ginther model has suggested an experimental strategy with far-reaching implications for research into instruction. It seemed likely in planning this study that it would have an equal value as a framework within which group interaction in situ could be described.<sup>14</sup>

### The Ginther Model

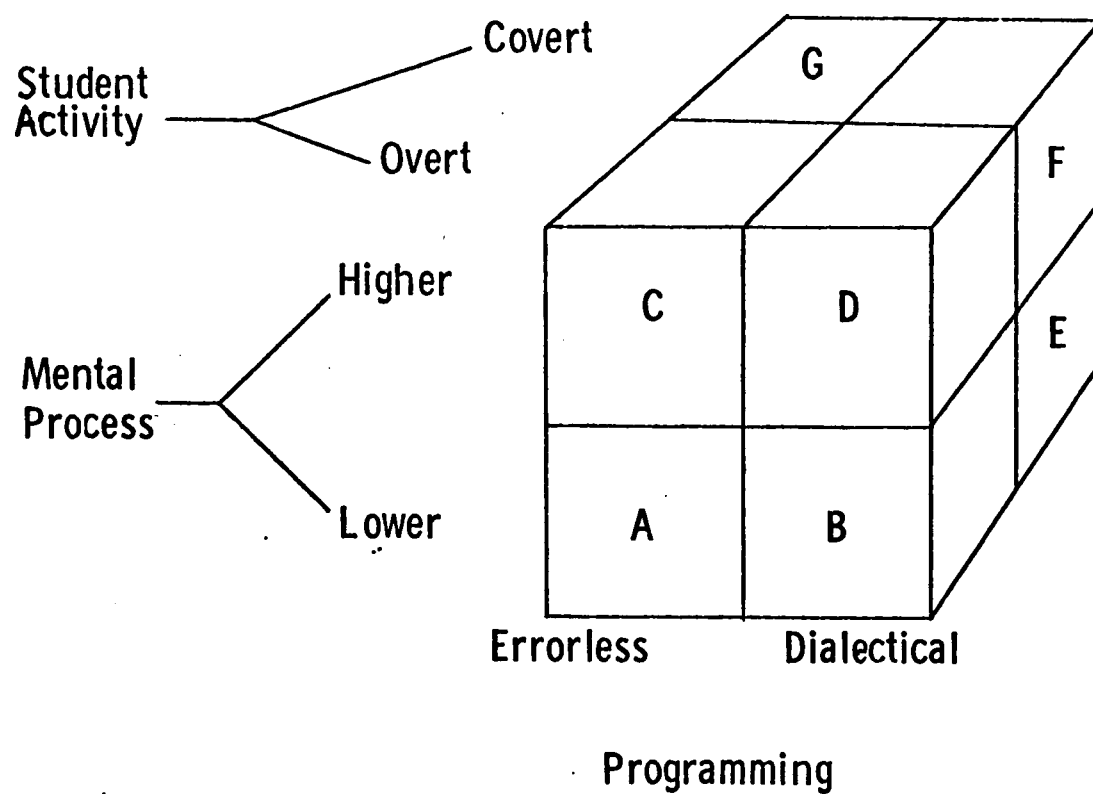
The Ginther model is set out in Figure 2. As has been suggested the model evolved in a context of work with programmed instruction but the work done so far within its frame suggests that it has value outside this area. In all events, the assumption of the model - that instruction is an

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<sup>13</sup> John R. Ginther, Conceptual Model for Analysing Instruction, Paper presented to the Conference of Programmed Instruction in Medical Education, Rochester N.Y., June, 1964.

<sup>14</sup> John Ginther and Robert Rippey, Personal Communication. The work of Ginther and his colleagues was reported to the 1965 meeting of the American Psychological Association.

Fig. 2 Three Dimensional Model of the Teaching-learning Situation



activity involving communication that is in large part made up of questions and answers - is not, despite its programming origin, a severe limiting condition for the extended pure monologue is a rare enough phenomenon in the classroom.

The horizontal dimension of the model represents a bi-polar conceptualization of the stance adopted by the teacher in the question-answer sequence; the errorless pole can be represented by the classical Skinnerian programme in which the student is led through a series of question steps so conceived that he will never, indeed can never, make a mistake. The opposite pole, the dialectical pole, represents a classroom situation in which (in Ginther's words) the student "is urged to manifest lack of information, misunderstanding," where the student can make wrong answers or explore tangential issues. A free and open discussion in which the teacher lays aside his formal instructional role to become a group chairman or source of incidental information would be represented by this pole.

This vertical dimension of the model represents characterization of the various mental processes, described loosely as lower or higher process, that are manifested by the participants of the teaching situation. The third dimension is a representation of the activities engaged in by the students: in roughest terms, the question is whether the student's reaction in the learning situation is overt or



covert. In the overt classroom the students will respond with either an audible verbal response or a recorded written response to the teacher's questioning; in the covert classroom the student is not encouraged to question out loud or in writing, and he is not questioned by the teacher. The most extreme example of this conception would be a typical radio broadcast or television lesson, but a university or public lecture could be an equally pure example.

The various cells of the model characterize the eight possible pure types of instructional situations. Cell A would, for example, characterize a classroom in which the teacher's activities or the teaching programme were designed so as to make the student respond overtly to questioning while at the same time minimizing the possibility of the response being incorrect. All responses would be described as examples only of lower mental processes. Cell D, on the other hand, would be used to describe a classroom in which students are called upon to make responses typifying higher mental processes - in a loosely structured discussion situation in which there is every possibility of the student making a wrong response or inference, and where each student is given every chance of testing his own ideas or understanding by active participation. Overt responses would be characteristic.

3. PHENOMENAL CLUSTERING: Cattell, Coulter, and Tsuijioka have suggested the use of the term phenomenal

clustering to describe the grouping of variables in such a way that each member of a cluster resembles each other beyond an agreed level of high resemblance; this process of clustering lies at the heart of Aristotelian taxonomic classification and involves the combination of standard elements into categories of higher order that, in turn, define recognizable phenomenal types.<sup>15</sup>

In the context of this study this suggestion of higher order taxonomic grouping raises the possibility that phenomenal clustering of the individual elements that make up an analytical set might be used to classify all the components of classroom group interaction. Just as the universal elements that can be used for analytical description of ship types, for example, deadweight, beam width, length, tonnage, number of guns, and so on cluster in such a way that war ship types, for example, destroyer, air craft carrier, and the like, emerge, the elementary terms of a language for describing group interaction behavior should cluster to produce recognizable higher order types of group interaction;<sup>16</sup> Bellack, Kliebard, Hyman, and Smith successfully performed

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<sup>15</sup> Raymond B. Cattell, Malcolm A. Coulter and Bien Tsujioka, "The Taxonometric Recognition of Types and Functional Emergents," Raymond B. Cattell, editor, Handbook of Multivariate Experimental Psychology (Chicago: Rand, McNally, 1966). See pp. 313-21.

<sup>16</sup> Ibid.

one such higher order grouping of the element of classroom discourse using statistical techniques.<sup>17</sup> A list of phenomenal clusters should approximate some listing, in the ordinary language of education, of the "methods" a teacher might use. It should permit, as a bonus, a more precise definition of these methods than is usual.

#### INITIAL DEVELOPMENT OF THIS STUDY

As suggested above three questions controlled the development of this study: What are the terms that must be used to describe teacher-student interaction? Can objective correlates of these terms be found in the behavior of teachers? and is it possible to construct content analysis instruments which reflect and can be used in practice to explore classroom teaching behavior? Three distinct levels of analysis were attempted: group and individual interaction, "mental process" and "programming" and of the isolation of higher-order phenomenal clusters.

These levels of analysis and their application to the questions set out above were not, however, of equal analytic difficulty. In particular, the categories suggested by Jackson of "group" and "individual" interaction were relatively unambiguous and could be used as category tools with-

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<sup>17</sup> Arno A. Bellack, Herbert M. Kliebard, Ronald T. Hyman, and Frank L. Smith Jr., The Language of the Classroom (New York: Teachers College Press, 1966).

out amendment.

The conceptual analysis of group interaction and the operationalizing of the analysis in terms of an observation instrument dominated the first part of this study. The overall intention of the work was to develop an instrument or instruments for the exploration of classroom verbal communication; the dimensions of the Ginther model suggested aspects of communication which controlled the thinking that lay behind the study at all stages. At the same time the increasingly-used Flanders' Interaction Analysis, called by Medley and Mitzel "the most sophisticated technique for observing climate thus far, one which is unique in that it preserves a certain amount of information regarding the sequence of behavior,"<sup>18</sup> was the model for the design of analytical instruments. The work that has been done with the Flanders' system has suggested a method and a battery of procedures that was more complete than that associated with any other widely-known interaction instrument. At the same time the Flanders' model does not require transcripts of periods. It seemed to be a reasonable assumption that the principles underlying the Flanders' instrument could be applied both to the procedural (or programming dimension of the Ginther model); and to a mental

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<sup>18</sup> Medley and Mitzel, op. cit., p. 27.

process code based on the Bloom taxonomy<sup>19</sup> (which Ginther suggests as the paradigm for classification of "mental process") was outlined for direct coding from tapes. The categories tentatively suggested for the coding of this dimension are set out in Figure 3.

In use, however, it proved impossible to make decisions about the flow of classroom communication which would permit classification of teacher-pupil interaction in the terms of this outline of mental process. There seemed to be no terms in a language of this type which could usefully serve for classifying recorded talk, although as a number of other studies have demonstrated, these terms, or ones that are very similar, can offer a framework for classifying a transcribed record of talk. The hypothesized categories 2 and 7, "information-giving", appeared to be usable and make sense but the remaining categories (apart from category 10 procedure and silence) did not seem at all appropriate or applicable to an analysis of what was later seen as talk. An attempt was also made to use the Flanders' system, but this system as well showed weaknesses in use which were partially corrected in the Amidon-Hunter modification.<sup>20</sup>

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<sup>19</sup> For example Benjamin S. Bloom et al., Taxonomy of Educational Objectives, Part 1, The Cognitive Domain (New York: David McKay, Inc., 1956), passim.

<sup>20</sup> Edmund Amidon and Elizabeth Hunter, Verbal Interaction

FIGURE 3  
CATEGORIES FOR CONTENT ANALYSIS

T  
E  
A  
C  
H  
E  
R  
  
T  
A  
L  
K  
  
  
S  
T  
U  
D  
E  
N  
T  
A  
L  
K

1. \* Affect: statements of like and dislike whether of persons or ideas or institutions in or out of the class: expressions of interest or lack of interest in subject matter: statements revealing teacher attitudes about non-instructional issues.
2. \* Information-giving: presentation of information gained directly from the text or another authoritative source. Presentation is authoritative and information, whatever its status, is presented as knowledge. No interpretative overtone.
3. \* Comprehension: information is translated from one form or level to another for purposes of explanation.
4. \* Application: basic material presented and explained is applied to new situations outside of the immediate problem and with a view to exploring tentatively its general application. General ideas are given specific reference and specific ideas are fitted into a general reference.
5. \* Analysis, Synthesis, and Integration: material is analysed, its appropriateness judged by reference to an external standard drawn from a much broader context; ideas are explored for general patterns; information is used in understanding of broader influences or ideas.
6. \* Affect: statements of like or dislike, approval or disapproval, whether of persons, ideas or institutions; expressions of interest or lack of interest in subject-matter.
7. \* Information-giving: material gained in class, whether from teacher or text, is reported back to the class without interpretation or comment.
8. \* Comprehension and Application: gives evidence of being able to use material in a new context, of re-ordering into new terms, of being able to explain meaning within a fairly narrow framework.
9. \* Analysis, Synthesis, and Integration: ideas garnered from inside class or outside class are developed and explored, applied to new and different situations, are fitted into a general context: are used in explaining broad influences or ideas.
10. \* Procedure and Silence .  
statements by either teacher or students.

It was more difficult to find a solution to the problems that the "mental process dimension" posed. It was difficult to extrapolate categories such as those of Bloom to analysis of the type suggested by the Flanders' system, to "talk". Ultimately a solution was developed in the terms of J.L. Austin's general classification of acts of linguistic communication. This solution suggested that the concept of "mental process" needed to be recast inasmuch as it omitted the prior question of the type of talk. However, the genesis of the questions in this study in the terms of the Ginther model continued to control the thinking behind the investigation with the result that it was not until the last stages of the work that the levels of analysis implicit in the whole were disentangled. This problem will be discussed at greater length in chapter 3.

Austin, an Oxford linguistic philosopher, was led by a concern for the fine nuances of language to attempt the most exhaustive and complete examination of speech acts in recent years, the results of which were published in an incomplete and fragmentary form in How To Do Things With Words.<sup>21</sup> Austin argued

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in the Classroom - The Verbal Interaction Category System (Columbus: Charles E. Merrill Books, n.d.) passim. See also Edmund Amidon and Elizabeth Hunter Improving Teaching (New York: Holt, Rinehart and Winston, 1966) ch. 2. For a discussion of these problems see ch. 4.

<sup>21</sup> See J.L. Austin, How To Do Things With Words, edited by J.O. Urmson (New York: Oxford University Press, 1965) passim; see also William P. Alston, Philosophy of Language

that when a speaker makes an utterance he is doing more than simply saying something. Speech is used in several ways: to ask questions, to give judgments, to make statements and so on. Each utterance has a force - asking, stating, telling and the like - which is inseparable in principle from the utterance itself. He called this force illocutionary force and argued that each time an utterance, in his terms a locutionary act is performed, an illocutionary act is eo ipso performed.

These terms of Austin's and their application in this study are discussed at length in Chapter 3. The idea of "force" has already made an important contribution to philosophical discussion of meaning, and an extension of this argument explains, at least in part, the difficulties that the concept of "mental process" caused. Although not couched in Austin's terms, the concept seemed to lie behind some of Bellack's concerns in The Language of the Classroom<sup>22</sup> and some of those of Matarazzo and his co-workers in their studies of psychiatric counselling.<sup>23</sup> There seemed, then, to be a

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(Englewood Cliffs: Prentice-Hall, 1964), Ch. 2; Ved Mehta, Fly and the Fly Bottle, Encounters with British Intellectuals (Boston: Little, Brown and Co., 1963), Ch. 2.

<sup>22</sup> Bellack, et al., op. cit.

<sup>23</sup> See Matarazzo and Weins, op. cit.: see also Joseph D. Matarazzo, Arthur N. Weins, and George Saslow, "Studies of Interview Speech Behavior," in Leonard Krasner and Leonard P. Ullman, Research in Behavior Modification (New York: Holt, Rinehart and Winston, 1966).



categorization of language and language behavior in Austin's work which offered a dimension of analysis that was both potentially important conceptually, and useful empirically, yet neglected in analyses of teacher-pupil communication. Some of the untidiness of this study and the continued use of two apparently related analysis systems is a function of the slow genesis of this understanding.

#### OUTLINE OF THE STUDY

This study falls into two broad yet related parts. In the first part the objective was the development and application of the two classroom analysis instruments. The second part was concerned with the tentative use of the instruments with a small number of classrooms from the teaching load of three social studies teachers in one western Canadian high school. The second part was the beginnings of, in Cronbach, Rajaratnam and Gleser's terms,<sup>24</sup> a "G" study to explore the implicit reliability, and therefore generalizability of the findings of the instruments.

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<sup>24</sup> Lee J. Cronbach, Negeswori Rajaratnam, and Goldine C. Gleser, "Theory of Generalizability: A Liberalization of Reliability Theory," British Journal of Statistical Psychology, XVI 1963, p. 63. See below p. .

PART 1

Part 1 was taken up with the conceptual analysis, and then exploration and development of two different devices for systematically recording and quantifying classroom behavior in situ. In particular it was hoped to determine whether or not it was possible to develop and use a coding instrument that could record the Force dimension of classroom talk directly from tapes of classroom behavior; it was felt that, if this could be done, two results, one technical and procedural, the other more substantive might follow. It was hoped that the task of transcription of lessons could be avoided with the implication of more expeditious - yet still important analysis - than other systems offer. More substantively, the elaborate rationale developed by Austin for the concept of illocutionary force promised that this was an important dimension of communication, one that might offer a language which might avoid some of the criticism voiced against such value-laden systems as that of Flanders. To be useful and effective it seemed that the instrument had to:

1. differentiate teachers and the classroom groups;
2. reflect important dimensions of teacher behavior.

Such an instrument had to be both conceptually and empirically valid and objectively scoreable; in addition it had to present results in such a way that they were amenable to sophisticated statistical analysis. It was hoped that it

would be possible to construct this instrument in such a way that it would be analogous to the Flanders' Interaction Analysis so that Markov statistical techniques, developed for Flanders' work, could be used and thus leave open the possibility of using more complex Markov techniques for further analysis.<sup>25</sup>

As the second phase of this part, it was hoped to use the Flanders' Interaction Analysis for coding of the programming dimension of classroom behavior. In use, however, the Flanders' system had severe drawbacks. It ignored seemingly important components of "programming" and presented statistical difficulties. The Amidon-Hunter adaption of Flanders' system met the first of these difficulties but not the second and so it seemed necessary to modify slightly, parts of this system as well.

## PART II

Part II of the study was devoted to two interdependent questions. The use of the instruments developed in the first part, and, ultimately their validity, assumes that it is possible to produce a summary, developed in the terms of the basic system (in this case a transition matrix) which

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<sup>25</sup> For a discussion of these statistical techniques see Appendix B, infra.

can be meaningfully generalized across some universe of persons, occasions or situations. A "G" study<sup>26</sup> explores the dimensions of this generalizability across some stated universe. Little attention has been given to the generalizability of observation studies between occasions within persons yet the establishment of some parameters for generalizability is a prerequisite for the meaningful use of any interaction analysis system as a basis for inferential studies of teacher-classroom behavior and either pupil outcomes or teacher characteristics. These problems do not seem to have been considered explicitly anywhere in the literature of interaction studies although such inferential studies are being attempted. Part II is centrally concerned with this question.

If it can be assumed, as most who have concerned themselves with teaching seem to postulate, that teachers have distinctive repertoire of behaviors and specific groups of characteristics, it seems reasonable to expect teachers to exhibit a characteristic range of behaviors over a number of periods observed from the class and between all classes taught by that teacher. The only variable, apart from teacher variation in behavior, that would seem to affect the situation would be pupil characteristics and variability;

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<sup>26</sup> Cronbach, Rajaratnam and Gleser, op. cit.

Matarazzo's work in the analogous field of interview behavior has suggested, however, that the behavior of the dependent actor in a dyadic situation at least is subject to the dominant actors' control.<sup>27</sup> Variation in classroom behavior would seem to be within the control of the dominant actor, the teacher, with the result that studies of teacher-student behavior can be presumed to be studies of the teacher rather than the class or students.

Yet there is an alternative possibility. A number of studies of teacher-student behavior have suggested that a teacher has a repertoire of behaviors and that there is variability in the use of these behaviors by teachers.<sup>28</sup> The nature of this variability between periods taught by a single teacher has not been investigated explicitly, however, and the only recommendation in the literature as to a recommended sampling period is that of Armstrong, DeVault and Larson<sup>29</sup> who suggest two and one-half hours of observation.

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<sup>27</sup> See Matarazzo, Weins and Saslow, op. cit., pp. 193-205, see also Erving Goffman, Behavior in Public Places, Notes on the Social Organization of Gatherings (New York: Free Press of Glencoe, 1963).

<sup>28</sup> For example J. Herbert, A System for Analyzing Lessons (New York: Teachers' College Press, 1967), p. 75.

<sup>29</sup> J.R. Armstrong, M.V. DeVault, and E. Larson, "Consistency of Teacher Communication: A Sampling Problem in Interaction Analysis", Abstract in American Educational Research Association, Abstracts of Papers, Anniversary Meeting, Chicago, 1966. (Washington, D.C., A.E.R.A., 1966.)

If it is presumed that behavior differences that stem from teaching methods are reflected in interaction instruments, variation should be expected, and should impose limitations on the easy generalizability of any findings to the universe of behaviors of any given teacher.

This question was investigated from the three directions in the study. More attention, however, was given to two rather different approaches to the basic question. In the first place an expectation of stability of behavior framed in terms of a number of hypotheses of "no difference" was tested by means of a number of eye-ball and statistical tests of constancy of behavior. These hypotheses are set out below:

- 1.1 There are no significant differences between the different periods within a given class taught by a given teacher in the frequency of different coded force behaviors.
- 1.2 There are no significant differences between the different periods within a given class taught by a given teacher in the frequency of the different coded programming behaviors.
- 2.1 There are no significant differences between the periods of the experimental grade level groups taught by a given teacher in the frequency of the different coded force behaviors.
- 2.2 There are no significant differences between the periods of the experimental grade level groups taught by a given teacher in the frequency of the different coded programming behaviors.

In the second place a quasi-factor analysis of the data in the summing rows of the transition matrices derived from the analysis of interaction was undertaken to explore

through tentative quasi-statistical reconstruction, the phenomenal clustering of the domain of data that was collected from the periods of the three teachers.

In addition Jackson's suggestion that there are differences in the amount of time which teachers give to group and individual interaction was investigated.<sup>30</sup> This distinction was developed in the context of an elementary school classroom and it has not been used in analysing secondary classrooms. It seemed nevertheless to offer a potentially promising way of distinguishing between teachers and with a view to using it as a basis for analysis the following exploratory questions were formulated:

1. What are the differences between the grades taught by given teachers in the ratio of individual interaction time to total classroom time observed?
2. What are the differences between experimental groups of classes taught by different teachers in the ratio of individual interaction time to total classroom time observed?

These themes are developed in the body of this study. Studies of teaching and the elaboration of the rationale suggested by Austin are discussed in Chapters II and III. Chapter IV describes the instruments, Chapter V outlines the experimental phase of the investigation and Chapters VI and VII explore the problems of the application of the instruments between occasions within one teacher by means of the

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<sup>30</sup> Jackson, op. cit., see above p. 11.

quasi-factor analysis and tentative analysis of the results that were obtained from the classes observed. Chapter VIII summarizes the study and offers some general comment on the themes and questions raised by the study.



## CHAPTER II - REVIEW OF RELATED RESEARCH

### THEORIES OF INSTRUCTION

The demonstrable lack of utility and pay-off in what is almost the entire tradition of research into teaching and school learning has justified a fresh attack, the product of the last few years, on the root problems that exercised this old tradition. Much effort, it has been suggested, has been given to both the conceptual-theoretical and empirical re-definition of the questions at the heart of the problem of teaching and learning that the older tradition sought to grapple with.

Much of the effort directed to this problem has been couched in terms of the development of a theory of instruction or theory of teaching that will attempt to set new criteria and new approaches to researching school learning and teaching. Little has been achieved to date ("achieved" is not, of course, the most appropriate word) but, as a direct result of these attentions, the concern of theorists with basic terms and questions has been given a new lease of life and empirical studies of teaching and school learning have benefitted from a new and widespread interest, rescued at least for the moment from the virtual certainty of null results that the older tradition was beginning to offer.

Perhaps the best known of these proponents of a fresh approach is N.L. Gage, in both the NSSE Yearbook on Theories of Learning and Instruction and in his chapter in the American Educational Research Association's Handbook of Research on Teaching, Gage has argued that a theory of teaching is necessary to supplement theories of learning to become a full partner in a theory of instruction.<sup>1</sup> He has drawn attention to the pessimism of earlier theorists about the potential usefulness of present learning theory - he quotes Hilgard in the NSSE Yearbook ("It is not surprising, therefore, that the person seeking advice from the learning theorist often comes away disappointed") and Estes ("No convergence is imminent between the educators' and the laboratory scientists' approaches to learning")<sup>2</sup> - in an advocacy of a theory that will concern itself with the "ways in which

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<sup>1</sup> N.L. Gage, "Theories of Teaching," in National Society for the Study of Education, Theories of Learning and Instruction, Sixty-Third Yearbook of the National Society for the Study of Education, Part. 1, edited by Ernest R. Hilgard (Chicago: the Society, 1964), Gage, "Paradigms for Research on Teaching," in Gage, Handbook, p. 133.

<sup>2</sup> Ernest R. Hilgard, Theories of Learning (New York: Appleton-Century-Crofts, 1956), p. 485: quoted in N.L. Gage, "Theories of Teaching," op. cit., p. 268. William K. Estes, "Learning," in Encyclopaedia of Educational Research, Edited by Chester W. Harris (New York: MacMillan, 1960), p. 767: quoted Gage, "Theories of Teaching," op. cit., p. 268.

a person influences an organism to learn."<sup>3</sup>

Teachers, Gage argues in the Handbook

. . . need to know how to teach -- how to motivate pupils, assess their readiness, act on the assessment, present the subject, maintain discipline, and shape a cognitive structure. Too much of educational psychology makes the teacher infer what he needs to do from what he is told about learners and learning. Theories of teaching would explicate how teachers behave, why they behave as they do, and with what effects. Hence, theories of teaching need to develop alongside, on a more equal basis with, rather than by inference from, theories of learning.<sup>4</sup>

The most significant point made in these two papers comes out of Gage's discussion of definition:

The term "teaching" should not be taken to imply that teaching is a basic process to which a general theory may apply. For "teaching" embraces far too many kinds of processes, of behavior, of activity, to be proper subject of single theory. We must not be misled by the one word, "teaching," into searching for one theory to explain it. If this argument is valid, the concept of teaching must be analysed to reveal processes or elements that might constitute the proper subject of theories. What kinds of analysis can be made?<sup>5</sup>

He goes on to suggest an analysis in terms of teacher activities, teaching objectives, and methods of student learning. Activities, he suggests, include such classroom

<sup>3</sup>Ibid., p. 268.

<sup>4</sup>Gage, "Paradigms for Research of Teaching", in Gage, Handbook, p. 133.

<sup>5</sup>Gage, "Theories of Teaching", op. cit., pp. 274-5.

procedures as explaining, encouraging, and supporting; objectives he broadly categorizes as affective, cognitive and psychomotor, and he sees student learning in terms of families of learning theory - conditioning, cognitive and identification theories - and the teacher activities which would mirror the components of these theories. A definition of teaching, and, somewhat confusedly, a theory of teaching comes out of combinations of these elements.

From the teacher's activities, let us select the one called explaining, leaving aside for the moment the mental hygiene, demonstrating, and other activities. Of the types of objectives, let us choose to focus on the cognitive domain, and, even more specifically, on the student's ability to extrapolate trends beyond the given data. Of the components of the learning process let us choose the perceptual, or the teacher's corresponding function of directing the student's perceptions to the salient part of his environment, which, in the present instance, consists of the kinds of trends in data that we want him to learn to extrapolate. And, finally, of the families of learning theory in accordance with which we wish to derive a theory of teaching, let us choose the cognitive restructuring approach.

At this point, having made these choices, we should be in a better position to develop a theory of teaching. Having eliminated many realms of phenomena from our concern, we have cut the problem down to size. We may still be far from our goal, but not so far as before.<sup>6</sup>

Gage's argument is far from well-developed at this point; without attempting explicit further definition he has initiated a programme of research into teaching and learning

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<sup>6</sup> Ibid., p. 277.

which develops these basic ideas, and merges them with the separately-developed notion of micro-teaching to produce the useful concept of micro-criteria of effectiveness, the effectiveness with which simple explicit learning ends are achieved through single, well-defined teaching activities such as explaining, drilling and the like.<sup>7</sup>

One study may be cited to illustrate Gage's concerns and methods. Forty eleventh grade social studies teachers were asked to deliver a fifteen minute lecture on a description of Yugoslavia taken from the Atlantic Monthly. They were told to prepare a lecture that would enable their students to answer a ten-item multiple choice test on the article's main ideas. After the lecture students took the test. On the next day the same students in classes did the same thing on a further article on Thailand and again the same testing procedure took place. On the third day the classes heard a third tape recorded lecture on Israel and took a further test. The tape-recorded lecture was used as a means of controlling for between-class differences in ability and it was assumed that the variance that still remained in the adjusted comprehension test means of the classes would reflect the differences between teachers in the influence of the teacher's own lecture.

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<sup>7</sup> N.L. Gage "An Analytical Approach to Research on Instructional Methods." Unpublished paper, Stanford University, 1966.

They found that there was considerable generality of effectiveness over topics even after student ability and content relevance had been partialled out.

Transcripts of the teachers' lectures were prepared and the ten of the most effective explanations, as determined by the test results and the ten of the least effective were examined in detail; dimensions such as sentence length, number of prepositional phrases per sentence, syntax, instructional set, familiarization, use of present knowledge, attention focussing procedures, organization, emphasis, repetition and redundancy, number of words per minute were used in this analysis. A number of these variables did discriminate between the ten best and ten worst explanations and gave similar results under further analysis of transcripts from periods not used in the initial exploratory analysis. These variables are assumed to hold promise for an understanding of the sources of effectiveness in lecture presentation.<sup>8</sup>

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<sup>8</sup> Unpublished work of Barak Rosenshine, reported by N.L. Gage and Barak Rosenshine to the Ontario Institute for Studies in Education Seminar on Research into Classroom Processes, Department of Curriculum, May, 1967. Reported in part in Barak Rosenshine, Objectively Measured Behavioral Predictors of Effectiveness in Explaining. Unpublished paper presented to AERA, Chicago, 1968.

"TOWARDS TAKING THE FUN OUT OF BUILDING  
A THEORY OF INSTRUCTION"

At this point experimental and quasi-experimental studies of the kind outlined above hold the greatest promise as instruments for the exploration of instruction. There is, however, a sense in which studies of this type are theoretically, if not practically, premature in that the conceptual bases of the research are less than satisfying, with the result - clearly seen in the Gage-Rosenshine study - that a rag-bag of variables is entered into the analysis without, seemingly, any clear grounds for inclusion or exclusion. Practically, of course, this approach is easily defended. However, theory-building, the ultimate aim of the enterprise, should permit description and conceptualization within a framework of a common and interconnecting system or model. Coherence and scientific usefulness of terms and interrelationships are the criteria of usefulness of theory and models and the efficacy of the model or theory in positing such relationships defines: understanding of the system that is defined and described. The random approach of the Gage-Rosenshine study permits inferences about statistical and phenomenal correlation; it does not necessarily lead to theory-impregnated inference that presumes some hypothesized and rational set of potentially meaningful and understandable relationships. This problem lies at the heart of concern

about theories of instruction.

The recent paper of R.M.W. Travers, "Towards Taking the Fun out of Building a Theory of Instruction", is perhaps the most important commentary on the problems raised implicitly by Gage's work. It is, at the same time, the most significant and sophisticated prolegomenon to a theory of instruction that addresses itself to the question of how a teacher influences or instructs a student or students in a school context.<sup>9</sup>

Travers attempts to set down the basic requirements and the problems posed by a search for a theory of instruction:

I would conceive of a theory of instruction as consisting of a set of propositions stating relationships between, on the one hand, measures of the outcomes of education to which the learner is exposed and the variables representing characteristics of the learner . . . . A major block in the development of a set of propositions or statements representing an instructional theory is that the technical language for such a task has not yet evolved.<sup>10</sup>

After establishing the difficulty of this enterprise and severely criticizing a number of attempts to develop an instructional theory, Travers sets out the basic categories that would seem to embrace the minimal set of terms required for viable theory-building; the terms containing the dependent

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<sup>9</sup> Robert M.W. Travers, "Towards Taking the Fun out of Building A Theory of Instruction", Teachers College Record. LXVIII, 1966.

<sup>10</sup> Ibid., p. 50.



variables must, he argues, be couched in a language based on a taxonomy of tasks and those containing the independent variables must be couched in a language based on pupil task variables, learner characteristics, teacher behavior and teacher characteristics. Any theory that included the two categories of teacher variables must be limited to those kinds of rule-regulated teacher behavior that can be observed and described.

Two themes interact in Travers' paper. There is, on the one hand, a concern for an inferentially-sound theory of instruction, or a set of such theories that describe different types of school teaching and learning; there is, on the other, an explicit discussion of the conceptual and the empirical problems involved in developing the specific terms that should be entered into such a theoretical system. Both of these themes are important, but in asserting this baldly a distinction between what seems immediately meaningful and possible and what seems less immediate needs to be given central attention. As Matarazzo et al. write in the context of psychotherapeutic studies molar phenomena:

important as they are, are not as amenable to immediate investigation as are smaller facets of the bigger problem . . . . The present writers are interested ultimately in erecting the psychodynamic penthouse of the skyscraper (personality). However, penthouses can be built first, without underpinning, no more easily in science than in architecture.<sup>11</sup>

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<sup>11</sup> Matarazzo, Weins and Saslow, op. cit., pp. 181-82.

A global understanding of overall direction is a necessary prerequisite for meaningful investigation, but an exclusive focus on an end is not necessarily the most parsimonious and fruitful approach to investigating it. The molecular elements must be established as objective, measurable and verifiable components before global pictures can be drawn. Gage and Rosenshine's approach permits this; a misreading of Travers' suggestions would lead to a potentially incorrect emphasis.

#### EMPIRICAL STUDIES OF TEACHING

This study is concerned then, with the description of teacher and student behavior through intensive study of classroom communication without a reference to student learning outcomes. It falls into a developing tradition of studies of the general type that Travers has commended as providing the beginnings of a language which can be used to describe his category of teacher behavior. The rest of this chapter will pick up some of the themes and approaches in the work that has been done to date in this tradition as background for the study to be reported in the balance of this paper.

One of the characteristic features of the research to be described here, indeed of most of the research reported to this point on classroom communication, has been the development of, and dependence on one or another of a number of systems for categorizing (in terms that are amenable to

quantitative analysis) aspects of the verbal interaction in the classroom. This general methodology, reflected most accessibly in Bellack's Theory and Research in Teaching<sup>12</sup> represents a union of the long-standing interest in educational research with rating and interaction tradition within social psychology.<sup>13</sup>

The characteristic features of most of the interaction recording procedures are described in a comprehensive chapter in the Handbook of Research on Teaching.<sup>14</sup> It is enough to notice here that the key feature of this instrument-building has been the development of category systems designed to record, in one way or another, predetermined moves or behaviors by teachers or students. Inevitably the system of categories selected for recording behavior reflects the experimental and theoretical intentions of the observer. The choice of construction of a system involves as careful an assessment of the intentions and concerns of the observer as does the choice of another measurement instrument.

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<sup>12</sup> Arno A. Bellack, editor, Theory and Research in Teaching. (New York: Bureau of Publication, Teachers' College, Columbia University, 1963), passim.

<sup>13</sup> See Donald Medley and Harold E. Mitzel, "Measuring Classroom Behavior by Systematic Observation" in Gage, Handbook, pp. 247-328; R.F. Bales, Interaction Process Analysis (Cambridge, Mass.: Addison-Wesley, 1950) H.H. Remmers, "Rating Methods in Research on Teaching", in Gage, Handbook, ch. 7.

<sup>14</sup> Medley and Mitzel, op. cit.

Many of the systems that have been used, particularly in the early phase of this developing research tradition, flowed from the well-established concern with classroom climate defined usually in the classical authoritarian-democratic way. The Flanders' system, the Medley and Mitzel OScAR (Observation Schedule and Record) and the early Withall system all stand quite directly in the tradition of educational research that acknowledge the crucial importance of the famous Lewin, Lippitt and White study.<sup>15</sup>

Yet this emphasis on social organization has been criticized in a number of recent studies. Medley and Mitzel themselves note that

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<sup>15</sup> These systems are described in Medley and Mitzel, op. cit., passim; see also Ned A. Flanders, 'Teacher Influence in the Classroom', in Bellack, Theory and Research, pp. 37-52. K. Lewin, R. Lippitt and R.K. White, "Patterns of Aggressive Behavior in Experimentally Created Social Climates", Journal of Social Psychology, X, 1939, pp. 274-99. See also John Withall and W.E. Lewis, "Social Interaction in the Classroom" in Gage, Handbook, pp. 683-741. The factors extracted from the Medley and Mitzel, OScAR reflect the concern of this tradition: "Emotional Climate refers to the amount of hostility observable in the classroom, a high score indicates a room in which external manifestations of warmth and friendliness are common and hostile reactions are rare . . . ." "Verbal Emphasis indicates the degree to which verbal activities predominate . . . ." "Social Organization has to do with the amount of social grouping and pupil autonomy in a class. A class scoring high was one in which it was relatively common to find the class broken up into two or more groups working independently, and in which the teacher talked relatively little." Medley and Mitzel, op. cit., pp. 282-83.

A principal defect in OSAR is its failure to get at any aspect of classroom behavior related to pupil achievement of cognitive objectives. The three dimensions that it measures represent what are probably the obvious differences among classes - how orderly and relaxed they are, in what ways the pupils are grouped, and the general content of the lesson being taught.<sup>16</sup>

In discussing this research tradition, Oliver and Shaver, who included an interaction study as part of a larger study of social studies instruction, compare their concern with this more traditional approach and point up some inadequacies of the older method.

Although at present there is little definitive research by which to judge the effectiveness of various types of teaching, a substantial body of research literature is based on the theoretical premise that interpersonal and affective components play a major role in determining an effective classroom dialogue. This, of course, is in sharp contrast to the conceptual framework presented so far in this book. Our main emphasis has been on the intellectual qualities of the dialogue as they move in problematic situation toward clarification and/or resolution . . . . In analysis, these workers apparently refer to the extent to which the teacher is responsive to information as it is construed and presented by the student. From our point of view this is only a precondition to judging the quality of further questions. It is necessary to ask further questions. For example, what relevance does the teacher's response have to the intellectual content of the child's statement?<sup>17</sup>

They quote a paper by Anderson who writes that

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<sup>16</sup> Medley and Mitzel, op. cit., p. 286.

<sup>17</sup> Donald W. Oliver and James P. Shaver, Teaching Public Issues in the High School (Boston: Houghton Mifflin Co., 1966), pp. 167, 170).

the authoritarian-democratic construct as far as education is concerned has far outlived its usefulness either as a guide to research or as an interpretation of leadership behavior.<sup>18</sup>

There are examples of application of these older assumptions in both the literature of recent interaction studies where the aim of the research worker has been simply the conceptualization and description of the verbal and non-verbal interchanges between teachers and students, and in other more general studies where interaction has been used as a dependent variable in investigation of other aspects of the instructional situation. There has been, however, some division of concern between these two schools of workers with the result that literature of one school rarely, if ever, includes reference to the work of the other.<sup>19</sup>

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<sup>18</sup> Richard C. Anderson, "Learning in Discussions: A resume of the Authoritarian-Democratic Studies", Harvard Educational Review XXIX, 1959, p. 212.

<sup>19</sup> All of the papers in Bellack, Theory and Research, come from the 'interaction' school with the exception, perhaps, of Flanders, op. cit., whose interest in 'interaction' is the product of a more general theory of instruction. Flanders is however, a member of the 'interaction' school. See also Edmund Amidon and Anita Simon, 'Teacher Pupil Interaction', Review of Educational Research, XXV, 1965, pp. 130-139; the 'instructional process' school has constructed a number of interaction analysis systems which are not referred to in the writing of the 'interaction' school. Some examples are; Daniel Solomon, William E. Bezdek and Larry Rosenberg, Teaching Styles and Learning (Research Reports, Center for the Study of Liberal Education for Adults, Chicago, 1963); and Richard J. Suchman, The Elementary School Training Program in Scientific Inquiry, U.S. Office of Education, Co-operative Research Project, No. 216 (University of Illinois, Urbana, 1962), mimeo. Some studies, of course, sit on both sides of the fence and

### SOME COGNITIVE CODING SYSTEMS

It has become a convention in the classification of classroom interaction studies of all types to use the broad categories of cognitive, procedural, and multi-dimensional to label types of coding systems.<sup>20</sup> Flanders' system which was described in Chapter I is usually discussed under a general heading of "procedural" or "affective." The pioneering study in the recent phase of interest in "cognitive" interaction is the work of B.O. Smith who used a set of what were thought of as logic-based categories to investigate the logical operations of teachers and pupils in the classroom.<sup>21</sup> Subsequently, Smith himself and other workers have used Smith's basic

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so the division of this work into 'schools' does not withstand rigorous use; it represents more a political and dissemination barrier than a research one. Studies which cross the barrier are represented by Hilda Taba, Samuel Levine and Freeman F. Elzey, Thinking in Elementary School Children, Co-operative Research Project No. 1574 (San Francisco State College, 1964) mimeo; and Oliver and Shaver, op. cit., especially ch. 9; see also the more comprehensive discussion of interaction studies in Donald W. Oliver and James P. Shaver, The Analysis of Public Controversy, A Study of Citizenship Education, U.S. Office of Education, Co-operative Research Project No. 8145 (Harvard Graduate School of Education, Cambridge, Mass., 1962), mimeo. The emphasis of Taba et al., and Oliver and Shaver is however, more broadly cognitive than is the emphasis of the earlier studies.

<sup>20</sup> See Amidon and Simon, op. cit., pp. 130-31; Oliver and Shaver, Teaching Public Issues, pp. 172-76; 'affective' and 'procedural' are, in use, broadly synonymous.

<sup>21</sup> B. Othanel Smith and Milton O. Meux, A Study of the Logic of Teaching, U.S. Office of Education, Co-operative Research Project No. 258 (University of Illinois, Urbana, 1962), mimeo.

units of analysis to produce both more general cognitive coding systems and a specific system designed to code cognitive operations in classes of gifted students.

Smith and his colleagues argued that since teaching consists largely of "what is done with and to pupils through the medium of words," to understand teaching "we must know what the actions" are that we perform linguistically . . . and what changes in the effectiveness of instruction will follow upon changes in the execution of such verbal actions."<sup>22</sup> The Smith studies attempted both to conceptualize and describe classroom interaction with the intention of producing some understanding of teaching.

In these studies, and in common with all of the other broadly cognitive studies, transcripts of tape recordings of eighty-five class periods observed along with running notes taken by observers, were used as the basic material for analysis. Five consecutive class sessions with seventeen teachers in five high schools in science (25 periods), mathematics (15 periods), English (15 periods), and social studies (30 periods) were recorded. Smith and Meux were able to break up these transcripts into a series of episodes, verbal exchanges between two or more speakers, and monologues,

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<sup>22</sup> B. Othanel Smith, "A Concept of Teaching", Teachers' College Record, LXI, 1960, pp. 236-37.



individual contributions to class talk. A completed episode consisted of an initiating sentence containing a statement (a claim, question, invitation, direction) which triggers off the exchange, a continuing phase, and closing or terminal phase. The first reports of Smith's work deal mainly with the classification of the statements or initiating episodes. His categories are outlined in Figure 4. Nuthall and Lawrence who were later associated with Smith, commented in 1965 that "the results of these preliminary studies have been sufficiently interesting and important to suggest that this type of analysis and classification should be carried further."<sup>23</sup>

Nuthall and Lawrence replicated and extended Smith's early concepts in a study undertaken in New Zealand. Eight junior high school teachers in arithmetic and language were recorded and transcripts made. The Illinois classification conventions were used and produced results which were similar to those obtained by Smith.<sup>24</sup> Subsequently Nuthall and Lawrence modified Smith's system of analysis to classify all of the questions asked by teachers with results that lead

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<sup>23</sup> Nuthall and Lawrence, op. cit., p. 8.

<sup>24</sup> Nuthall and Lawrence, op. cit., pp. 13-14. Flanders reports a similar finding between schools in Wellington, New Zealand and Minneapolis-St. Paul, using an early form of his instrument. See Flanders, Teacher Influence, Pupil Attitudes and Achievement, pp. 55-56.

FIGURE 4

Set of Categories For Classifying  
Entries (Opening Phases of Episodes)  
From Typescripts Made of Sound  
Recordings in High School Classes\*

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1. Defining - Entries making up this group are concerned with how words or other symbols are used to refer to objects (abstract or concrete). These entries vary in form and content, but in general they ask, implicitly or explicitly, for the meaning of terms.
  2. Describing - To describe is to represent something by words or drawing, to tell about something. Thus the entries making up this category mention or suggest something and require that an account of this something be given.
  3. Designating - To designate is to identify something by name -- word or other. The name designates the object (abstract or concrete) to which it refers. Thus this group of entries is made up of items in which something is described or otherwise indicated, and the name used to refer to it or to identify it is asked for.
  4. Stating - Entries in this group do not ask for names, descriptions, etc., but for things to be stated. They may ask for statements of issues, steps in proofs, rules, obligations, theorems, conclusions, ideas, beliefs, promises, threats, etc.
  5. Reporting - The entries in this group ask for a report on what a book of document says, for information in the test, or for a summary or review, and the like.
  6. Substituting - The entries making up this category ask the student to perform a symbolic operation, usually of a mathematical nature.
  7. Valuating - To engage in valuating is to estimate the worth, dependability, etc., of something. An entry of this type requires that some object, expression, event, action, or state of affairs be rated as to its value, dependability, desirability, and the like.

8. Opining - To opine is to express beliefs, usually based on little or no evidence. Such beliefs are about what is possible, what might have been and is not, what might obtain in the future, or the like.
9. Classifying - Each entry in this group makes explicit reference to an instance or class (type, sort, group, set, kind) of things or both. The entry requires that a given instance be put in the class to which it belongs, as a subclass.
10. Comparing and Contrasting - This type of entry requires that two or more things -- actions, factors, objects, processes, etc. -- be compared. In some cases, the entry specifies two or more things, and asks that either their similarities or differences be noted with respect to a particular characteristic.
11. Conditional inferring - This category consists of entries, each of which contains an antecedent and a consequent, but never a consequent alone. In all cases where the antecedent alone is given, the entry requires that the consequent -- effect, result, outcome, subsequent behavior -- be supplied as the answer. Some of the entries containing both an antecedent and a consequent ask for value judgments, some ask for statements of result or outcome, and others for descriptions of actions, decisions, and the like.
12. Explaining - There are several types of explanation entries, but they all have one thing in common. They give a particular consequent and they require that an antecedent be supplied. There are six kinds of explanation entries, depending upon the sort of antecedent used to account for the consequent. They are mechanical, casual, sequent, procedural, teleological, and normative.
13. Directing and Managing Classroom - Many questions asked by teachers have little or no logical significance. They are designed, not to evoke thought, but to keep the classroom activities moving along.

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\* Adapted from Smith

them to question the usefulness of the episode concept. In addition, they attempted analysis and categorization of explanation incidents within the classroom, and of student errors in these explanation incidents. This work indicated that incorrect or inadequate information was not the most significant source of error; rather the major categories of error were due to failure to hear, understand or attend to the point of the question; wrong, inappropriate, or inefficient procedure or action even although the question had been understood; misuse of evidence, lack of explicitness, and avoidance of explanation and substitution of partially irrelevant associations.<sup>25</sup>

Oliver and Shaver criticize Smith's approach however:

In an effort to bring the logical elements of classroom discourse back into the center of research in teaching, Smith and his associates have emphasized the need to discover ways not only of encouraging the child to reflect and inquire but also of teaching the child to reflect and inquire in a disciplined and intelligent way. Although we are in substantial agreement with this position, two reservations are in order. First, Smith apparently begins with a conception of 'logic' which is presumed to be generally useful in various curriculum areas. Perhaps one might better begin with the species of problem with which a particular type of student-teacher dialogue is intended to deal and inquire into the intellectual framework required to clarify or resolve this type of problem. Second, ignoring the role of interpersonal affect and the problems of classroom procedure and control, Smith dismisses the possibility that effective classroom teaching may be based on affective

and procedural as well as logical factors. It may well be that the inter-relationships among a number of such dimensions will best predict successful teaching.<sup>26</sup>

In 1964, Smith and co-workers published a further report outlining their work since the first report on the tactics of teaching.<sup>27</sup> In the first stages of his early work Smith had made a distinction between tactics of teaching and strategies of teaching. He argued that episodes or simple interchanges between teachers and students of the form

Teacher: When was Sir Isaac Newton born?

Student: 1642

Teacher: Okay

and teacher or student monologues constitute the tactical elements of classroom strategies, the "pattern of acts that serves to attain certain outcomes and to guard against certain others."<sup>28</sup> In this second report Smith and his colleagues describe their attempt to break the classroom transcripts prepared for the first stage of the study into strategic units. Initially they distinguished a unit of a lesson which they termed a "venture:"

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<sup>26</sup> Oliver and Shaver, Teaching Public Issues, pp. 171-72.

<sup>27</sup> B. Othanel Smith, Milton Meux, Jerrold Coombs, and Graham Nuthall, A Tentative Report on the Strategies of Teaching, U.S. Co-operative Research Project No. 1640 (Bureau of Educational Research, University of Illinois, Urbana, 1964), mimeo.

<sup>28</sup> B. Othanel Smith, "Toward a Theory of Teaching," in Bellack, editor, op. cit.

As one reads transcriptions of a class period, he notes that it seems to break into a few sections -- typically, five or six -- each one consisting in a treatment of a particular topic. The term "topic" cannot be defined to the point that either ambiguity or vagueness is completely avoided. In fact, a topic is more easily "sensed" as one reads the discourse if he does not try to keep a definition of the terms in mind. The presence of a topic is indicated by the coincidence of the judgment of independent analysis as to the beginning of a new topic.

A second condition of a unit is that its discourse be relevant to the objective . . .

The unit of discourse which best meets these conditions is called a venture.<sup>29</sup>

They were able to develop criteria for the identification of 'ventures' which could be applied to the transcripts with interjudge coefficients of agreement ranging between .56 to .89 (median .70); these coefficients were regarded as "satisfactory for our purpose."<sup>30</sup>

They then attempted to classify ventures according to their "cognitive import:"

As one reads the discourse in a venture it becomes clear that the venture has a central point. There is a sort of conclusion to which the verbal exchanges lead, a sort of theme that seems to pervade the exchanges. This constitutes the import of the venture, and it is its import that we have in mind when we speak of the venture's objective. . . . The expression "content objective" was chosen deliberately to indicate that we had in mind the cognitive import of the discourse rather than the

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<sup>29</sup> Smith, Meux, Coombs and Nuthall, op. cit., pp. 4-5.

<sup>30</sup> Ibid., pp. 22-40.

intentions of the teacher or the student's achievement . . . . It is what a reader would grasp and the central meaning of the segment of discussion.<sup>31</sup>

Nine types of venture were identified according to their objectives; causal, conceptual, evaluative, informatory, interpretative, procedural, reason, rule, and system. Smith went further to identify sets of ventures or combinations of ventures of different types making up conceptual ventures:

There are, of course, many sorts of concepts - some are abstract and some are concrete; some are extremely complex involving many other concepts as sub-concepts or elements, while others are simple, involving only a few, if any, parts. Most of the concepts dealt with in the classroom are both complex and abstract . . . . When one analyses the verbal discourse in a conceptual venture, he finds a variety of moves -- some emphasizing the characteristics of a class of objects, some indicating the parts of an object, others giving instances of the class, and so on. Reference to these characteristics, parts, instances, etc., comprise the content of instruction. In other words, a move in a concept strategy, and, for that matter, in all treatment strategies, always carries a content.<sup>32</sup>

Eighteen types of moves in conceptual ventures were identified; criterion description, analysis, enumeration, classification, classificatory description, analogy, differentiation, negation, opposition, sufficient conditions, instance production, positive instance, negative instance, instance substantiation, instance comparison, instance variances, operation variance,

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<sup>31</sup> Ibid., p. 21.

<sup>32</sup> Ibid., p. 55; for a discussion of conceptual ventures see ch. 5.

and meta-distinction.

Strategies are the combinations of these moves but, in the words of the report, "the number of different strategies found in the sample of classroom discourse is too large to permit discussion of all of them here."<sup>33</sup> One example of strategy can illustrate Smith's intention: a Type 1 Strategy consists entirely of abstract moves and is one of the more typical strategies within classroom talk; there are four sub-classes so far identified of the general type. Sub-type B consists of an initial abstract move supplemented by one or more criterion description moves. The elements of the Type 1 strategy are set out in Figure 5.

#### THE BELLACK STUDIES

Similar pioneering studies of teacher behavior have been undertaken by Bellack. Tapescripts were collected from four consecutive periods of a unit based on a limited number of chapters of a specified text taught by fifteen teachers of economics to senior high school classes. Teachers were asked to cover the material to prepare for a post-test to be conducted at the end of the teaching session.<sup>34</sup>

Bellack's rationale will be discussed in some detail

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<sup>33</sup> Ibid., p. 60; for conceptual strategies see ibid., ch. 6.

<sup>34</sup> Bellack, et al., op. cit.



FIGURE 5

## TYPE 1 STRATEGY\*

- (1) Classificatory description\*\*
- T: Now--what is a synapse? What is a synapse?
- S: How do you spell that?
- T: S-Y-N-A-P-S-E, S-Y-N-A-P-S-E. What is a synapse? Gilbert?
- S: It's the junction of the "axon"? Is that how you pronounce it?
- T: Axon
- S: Axon and the dendron.
- 
- (2) Criterion description
- T: The junction of--or which of one nerve is going to join up with which one of the other? Do we have the--the junction of a dendron with an axon or an axon with a dendron? Margaret?
- S: Uh--the junction of an axon with a dendron.
- T: All right.
- 
- (3) Criterion description
- S: Both in different neurons.
- T: Both from a different neuron. All right.
- 
- T: Do these--does the--axon of one--nerve cell unite or join with the dendron? Don?
- S: I believe there's a small gap there, and the impulse has to jump the gap?

T: Yes, it does. They do not connect. Our definition, then, is a junction--where they meet. They don't meet in--in that they touch each other, but it is--there's a small gap there where the impulse must jump from one group--from one to the other.

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\* After Smith, Meux, Coombs and Nuthall, op. cit.

\*\* Each move in the strategy is marked and labelled.

in the next chapter; however, there is no explicit connection presented in his study between this rationale and the categories of his analytic system that will be presented here. Four basic pedagogical moves were identified in the transcripts and an analysis of all transcripts was made using pedagogical move and four dimensions of talk as the fundamental coding units: substantive meaning referring to the subject matter of the class and derived from a content analysis of the material being studied, substantive-logical meaning referring to the cognitive processes involved in dealing with the subject matter (defining, explaining, fact-stating, etc.), instructional meaning referring to the routines of the classroom, and instructional-logical referring to such classroom processes as evaluating, explaining procedures or directing. These general categories were further subdivided into complete analysis system: the complete set of categories is set out in Appendix C.

Bellack went on to analyse descriptively the data collected from his sixty class sessions. He found that the teachers made fifty per cent more moves than the students and spoke three times as many lines. Ninety per cent of the moves recorded were soliciting, responding and reacting moves, and of these it was the teachers who made the structuring, soliciting and reacting moves leaving responding for the students. Of twenty-one possible teaching cycles or patterns of moves two, solicitation-response-reaction and solicitation-response,

accounted for more than half of the cycles. More than half of the moves were classified in the substantive empirical mode (fact-stating and explaining) rather than the analytic (defining and explaining) or evaluation (opining and justifying) modes.

Bellack attempted, in addition, to approach the higher order classification that Smith attempted through his categories of "venture", "conceptual venture" and "strategy" through statistical exploration of the clustering of moves. The development of this further concept of "teaching cycles", larger units of verbal behavior, described patterns of pedagogical moves and the relationships of moves to each other. Cycles could be identified and their quality could be described, and in doing this Bellack arrived at what were, implicitly, higher order classifications, representing phenomenal clusters based on differing constellations of the basic units of analysis.

The work of Smith and Bellack has been described at some length to give both the flavour of the sorts of conclusions that have been reported to date from the classroom research based on content analysis and to illustrate some of the problems of classification of mental process. These two systems are transcript-based and differ, therefore, fundamentally in technique from the tape-recording based systems developed for the study. Nevertheless, there are general

similarities between this work and the work to be reported here. Thus, both Bellack and Smith attempted to move from specific classification of individual moves to higher level taxonomic classification of units at a different level of analysis. Smith's "ventures" and "strategies" and Bellack's "cycles" are high level classifications of this type.

However, the most important observation to be made on these studies is in the type of analysis attempted of the so-called "cognitive" property of the language of the classroom. Thus, there is a sense in which the categories set out in Figure 4 above do not represent categories of any logic as such, but refer, in the manner that will be described at length in the next chapter, to the intent of the communicator or, more precisely, to how the communication should be taken rather than to the properties of the communication itself. Bellack's substantive-logical categories have the same quality although again, Bellack refers to them as logical. This suggests that the so-called cognitive property of these systems does not have the usual connotation of "cognitive," with its implications of either rigorous intellectual properties or of information processing within a mind. The implication is that what is being attempted in this study and the assumption that mental process can be represented by Austin's illocutionary force is close to the intent of these earlier studies. If this is so, the transcript base of the Smith and

the Bellack studies does not imply that, in results, their work is necessarily far removed from what might be achieved here.

### CONCLUSION

It is difficult to sum up the results of these typical studies of the teaching process. The problem of drawing general conclusions is compounded by the range and scope of the variables studied, differences in focus, population and setting and the variation in the methods of analysis that are characteristic of the area. Kliebard's review of the studies completed since the writing of the Medley and Mitzel chapter in the Handbook of Research in Teaching, reports on six studies with five different population grade levels and six different foci.

Principal Investigator	Focus	Population and Setting	Procedure
1.	classroom language; meaning	high school social studies	typescripts; tape recordings
2.	teacher-pupil communication	private elementary school	direct observation
3.	observation as teacher training	upper elementary grades	direct observation tapes; typescripts
4.	role behavior; class activity	fifth-grade underachievers	direct observation
5.	teacher strategies	high school	typescripts
6.	cognitive skills	elementary social studies	typescripts <sup>35</sup>

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<sup>35</sup> Herbert M. Kliebard, "The Observation of Classroom Behavior", in The Way Teaching Is, op. cit., p. 74.

Another review lists the following variables: grade level, subject matter, social class of pupils, achievement of pupils, other pupil variables, that is, emotional disturbance, rated teacher competence, sex of teacher, age of teacher, subject matter, grade level, teaching style, teacher training, nationality, and phases of the school year. The categories that have been used in analysis vary as widely.<sup>36</sup> No attempts have been published to date describing attempts at reconciliation even of the dimensions of analysis.

This relatively simple task remains undone, although without an attempt to do this with the implications of a concern for the underlying concepts being used in analysis, no conclusion is possible. One must rest content with echoing Kliebard's comment that

it is difficult at this early stage of the game to evaluate these studies in terms of the ultimate contribution they will make to a useful description of the teaching process -- a conclusion, which it is hoped, will provide some basis for teaching theory.<sup>37</sup>

An attempt must be made, both from a statistical and a conceptual-philosophical point of view, to search for community of meaning between the concepts used in these many studies. An attempt must be made (as has rarely been made) to guarantee

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<sup>36</sup> Bruce J. Biddle, Review of Related Literature, unpublished manuscript, 1966, passim.

<sup>37</sup> Kliebard, op. cit., p. 74.

that, as Medley and Mitzel demand, rigorous and systematic analysis be made of the limited and hard-won data that is available. This study, it should have been added, only adds further variables and perhaps confusion to the task of the workers who attempt this.

Four explicit comments on the tradition can, however, be made and need to be met by all studies in the general field:

1. No attention has been given in any of the studies reported to date to an adequate search for the nature of the generalizability of the results that are derived from any instrument. In all cases reliability, the concept which lies at the heart of this problem, is defined as inter-observer or intra-observer agreement and not as an expression summarizing the generalizability of the results obtained to some previously stated universe of concern.<sup>38</sup> If the universe of concern is teacher behavior (teacher defined as some generalized teacher as in the Bellack study) then this problem is less significant; if, however, the concern is with a teacher's behavior the problem becomes, as will be shown in detail in the latter parts of this study, acute but has received little attention. Apart from Medley and Mitzel's explication no

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<sup>38</sup> See above Ch. 1 : Cronbach, Rajaratnam and Gleser, op. cit., passim.



theoretical consideration of these questions is widely available.<sup>39</sup>

2. As Biddle notes<sup>40</sup> little use has been made of appropriately complex statistical techniques in either the analysis of stabilities in patterns of behavior or in the construction from the simple record of observation of more complex patterns of behavior. The uses of Markov techniques in Flanders' and Bellack's work are two of the relatively limited numbers of examples of approaches of this sort.

3. There is no lasting concern for the social context of the classroom or for the theoretical question of the nature of the communication act. Such discussion as there is of communication, speech and verbal interaction, of the milieu created by the communication within the classroom for the students and of the environment outside the lesson either by the teacher's total pattern of interaction within the environment of the whole school or the day is fragmentary at best. Some of the discussion that exists of these questions will be reviewed in the next chapter.

The most important shift that occurs through the developing pattern of interaction studies is a developing

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<sup>39</sup> Medley and Mitzel, "Measuring Classroom Behavior by Systematic Observation", op. cit.

<sup>40</sup> Biddle, op. cit.

concern for the nature of the classroom and for the lesson; there is a distinct and growing concern in more recent studies for the analysis of the very nature of the classroom whether as a social or a communication system. The recent work of L.M. Smith and Geoffrey<sup>41</sup> on the elementary classroom as a social system stands in marked contrast to the impression one receives from the earlier studies of the classroom as a fixed, clearly-defined and purposeful social system in which teachers and students, as objects within a fixed and completely known and knowable environment, were to be studied. At this point, however, the full development of this concern within the specific framework of interaction studies is as embryonic as is the systematic development and exploitation of observational instruments.

4. Closely parallel to this last concern is the persistent failure of interaction workers to take account of the type of distinction made by, for example, Ferster between a "topographic analysis", the simple identification of performance and a "functional analysis," the identification of performances in a context of reference to antecedent and consequent conditions in either the human actors or the

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<sup>41</sup> L.M. Smith and W. Geoffrey, Toward a Model of Teacher Decision Making in an Urban Classroom (St. Louis: Graduate Institute of Education, Washington University, 1965).

environment. In such functional analyses the relation of behaviors to events in the past or the present environment is the critical element.<sup>42</sup> Ferster's distinctions are couched within the operant conditioning frame and are therefore subject to the terminology of that tradition; but the point of his distinction, the need for a reference to some framework of expectation and the consequent possibility of theoretically-meaningful experimental manipulation suggests the most persuasive, and at the same time the most damaging criticism of almost the entire tradition of interaction research to date. All of the work reported in the Krasner and Ullman volume has clear theoretical reference, is experimental in its approach and has a fairly clear conception of where it fits in a total framework of behavior therapy.<sup>43</sup> There is little concern for these issues within the interaction tradition with the consequence that it is difficult to see what results from specific studies mean, how they fit with other results, or what the whole enterprise is for. To demonstrate that any particular study is meaningful it is necessary to either meet objections of this type or else show that it is inappropriate

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<sup>42</sup> Charles B. Ferster, "Classification of Behavioral Pathology", in Krasner and Ullman, op. cit., pp. 9-11.

<sup>43</sup> Krasner and Ullman, op. cit., passim.

to apply these standards to a particular enterprise. A tentative venture in exploring some of the basic language problems is made in Chapter III of this study but in most respects this study is as inadequate as are the others in the interaction tradition.

## CHAPTER III - THEORY

### INTRODUCTION

The tradition of research that has been described in the previous chapter rests, at least in intent, on a concern for a poorly formed theory of instruction, at best at this point a language and concept system for describing and understanding the phenomenon of teaching. The research conducted under this rubric has, in the main, tended to be preoccupied with data collection; there has not been a parallel preoccupation with the conceptual framework within which teaching should be described. Only B.O. Smith and Bellack have formally elaborated frameworks within which their analysis have been conducted; this chapter will review their contributions and elaborate the rationale upon which this study is based.

### THE ANALYSIS OF CONCEPTS

Brodbeck writes in her discussion of methodological problems in research on teaching in the Handbook that:

Some features of the world stand out, almost begging for names. Concepts of clouds, thunder, dog, wealth, hunger, child, colors, tastes, and the like, name differentiated slices of reality that willy-nilly impinge on all of us. The concepts of common sense name these obtrusive daily experiences. Other features of the world have to be cut out, as it

were. They are discerned only by a more subtle and devious examination of nature, man, and society than is made in everyday life. These more covert aspects of experience are named by the concepts of science.

Concepts like mass, and momentum, IQ and reaction potential, primary group and totalitarianism, name attributes of things that do not stand out as do love and hunger, colors, tastes, and odors.<sup>1</sup>

A good concept, Brodbeck points out, is significant as it enters into laws, in other words, as it relates to other things and as it refers to something that can be understood and conceptualized without confusion. Bad concepts do not permit much to be said or many things to be related; they do not offer viable starting points for theory building. Sometimes a seemingly obvious concept, one which in Brodbeck's words "stands out" is in fact a bad concept and inhibits the growth and development of useful theory.

Numbers of writers have pointed out that what is almost an official theory of teaching and learning - that good teaching must result directly in learning, with the result that teaching cannot be studied separately from learning - is an example of such a bad concept and, although no widely accepted alternative approaches have been adopted, the argument was accepted (for different reasons) in the previous chapter and has even penetrated the general literature.<sup>2</sup> It

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<sup>1</sup> May Brodbeck, "Logic and Scientific Method in Research on Teaching," in Gage, *Handbook*, p. 48; italics in original.

<sup>2</sup> See John Walton, *Towards Better Teaching in the Secondary Schools* (Boston: Allyn and Bacon, 1966), ch. 3.

was first made explicitly by B.O. Smith in the course of his initial study of The Logic of Teaching and has served as the jumping-off point for much of the recent activity. It has justified the attention given to teaching as an activity worth study in its own right and is one of the roots of the case for a theory of instruction.

Smith's argument ran like this. If a concept is to be used carefully, looseness and untidiness of expression must be pared off and an attempt made to find out what the terms that are used in a statement really mean. The naive assumption that teaching must produce learning and therefore must be studied in a context of learning rests on an analogy (often used by Dewey and Kilpatrick) of buying and selling.

The buying-selling analogy can be reduced to this form: "I am selling X and someone is buying it from me." In this form it is implicitly tautological. It would be contradictory to say "I am selling X and no one is buying it from me." On the other hand "I am teaching X to A and he is not learning it" is not tautological, for it is not contradictory to say "I am teaching X to A and he is not learning it" or "A is learning X and no one is teaching it to him," for the terms "teaching" and "learning" fall into different logical categories.<sup>3</sup> He goes on to use the distinction which the

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<sup>3</sup> Smith argues this in B.O. Smith, "A Concept of Teaching," in B.O. Smith and Robert H. Ennis, Language and Concepts in Education (Chicago: Rand, McNally and Co., 1961) p. 90.

Oxford philosopher Gilbert Ryle explored in his The Concept of Mind between a category of task words and a category of achievement words which, despite grammatical similarity, have widely different and distinct logical force.<sup>4</sup> A task word, Ryle suggests, implies a process which continues over time and can, therefore, be qualified by an adverb; an achievement word, on the other hand, finds its reference in the state of affairs that it assumes and stands, most often, without adverbial qualification. Words like "to win," "to hear," "to cure" or "to find" all imply states of affairs over and above the simple tasks that they seem explicitly to refer to: "to win" implies a race and one runner crossing the finishing line ahead of a number of other competitors - to cross the line implied the end of the race. "To run" on the other hand, implies only a runner moving in a certain way and at a certain speed - there is no implication of winning, of a tape, of a gold cup, of a race, of any goals. "To hear" implies an ear cocked and something picked up; "to listen" does not have this last implication. These categories can be applied to the term "teaching" and "learning"; "Teaching is a task word and learning is the parallel achievement word," Smith writes. "It makes sense to say that we teach unsuccessfully, but it is self-contradictory

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<sup>4</sup> Gilbert Ryle, The Concept of Mind (New York: Barnes and Noble, 1949), pp. 149 sqq.



to say we learned French unsuccessfully."

That learning does not necessarily issue from teaching, that teaching is one thing and learning is quite another, is significant for pedagogical research. It enables us to analyse the concept of teaching without becoming entangled in the web of arguments about the processes and conditions of learning: in short, to carry on investigations of teaching in its own right.... What is needed for scientific inquiry is a concept which recognizes teaching as a distinctive phenomenon general enough to embrace normative definitions as well as special cases.<sup>5</sup>

Smith's argument has been useful in its pay-off, but unfortunately it does not lead too far: it has stimulated, by serendipity, much of the interest in teaching as an activity worth intensive study for its own sake, but it does not lead to a solution for a number of real and difficult conceptual problems associated with both a full philosophical explication of teaching and the empirical exploration of the teaching act. His analysis does not help to explain the differing and essentially reciprocal intentional and moral forces of the concepts. It does not meet, for example, Scheffler's explication that "teaching as normally understood, is an activity requiring effort and allowing for the exercise and development of proficiency, and oriented toward a goal that may lie beyond

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<sup>5</sup> Smith, op. cit., p. 90. See also: G.R. Eastwood, Categories, Concepts and Ostensive Learning, unpublished paper presented to the Annual Meeting of the Northwest Philosophy of Education Society, Missoula, Montana, Nov. 21, 1964, p. 1; and Israel Scheffler, The Language of Education (Springfield: Charles C. Thomas, 1960), chs. 1-3.

any segment of it."<sup>6</sup> His argument does not avoid the moral claim that teaching should be successful and should produce change which is embodied and symbolized (and that properly) in the official notion. It does not help Smith himself to conceptualize teaching, for in his own empirical study he turns to a psychological paradigm for his terms.

#### THE APPROACH OF ARNO BELLACK

The only other worker to attempt a self-conscious conceptualization of teaching is Bellack.<sup>7</sup> He turned aside from further development of the complex distinction that Smith was attempting to make as a prelude to his later empirical work and approached teaching as a phenomenon that must be understood directly.

Bellack introduced Wittgenstein's metaphor of "game" into his study to clarify both the nature of the verbal interplay of teaching and to explicate, less surely, the meaning of the terms and words used in the classroom. "Think of the tools in a tool-box," Wittgenstein writes:

There is a hammer, pliers, a saw, a screw-driver, a rule, a glue-pot, glue, nails, and screws. The function of words are diverse as the functions of these objects. (And in both cases there are similarities.)

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<sup>6</sup> Scheffler, op. cit., p. 63.

<sup>7</sup> Bellack et al., ch. 1.

Of course, what confuses us is the uniform appearance of words when we hear them spoken or meet them in script and print. For their application is not presented to us so clearly. Especially when we are doing philosophy.

\* \* \*

12. It is like looking into the cabin of a locomotive. We see handles all looking more or less alike...

13. When we say: "Every word in language signifies something" we have so far said nothing whatever: unless we have explained exactly what distinction we wish to make.

\* \* \*

23. But how many kinds of sentences are there? Say assertion, question, command? - There are countless different kinds of use of what we call "symbols," "words," "sentences." And this multiplicity is not something fixed, given once for all; but new types of language, new language-games, as we may say, come into existence, and others become obsolete and get forgotten...

Here the term "language-game" is meant to bring into prominence the fact that the speaking of language is part of an activity, or a form of life.<sup>8</sup>

Bellack builds from Wittgenstein to suggest that classroom talk should be viewed as a game: the right to speak and what can be said are governed by ground rules; the period is a social activity in which the players fill different, but complementary roles. By implication he seems to suggest that the nature of classroom discussion demands certain

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<sup>8</sup> L. Wittgenstein, Philosophical Investigations (Oxford: Blackwell, 1963), Part 1, Paras. 11, 12, 13, 23.

initiations or responses from the persons involved, the situation in a sense controls or constrains the events that it embraces.

Philosophically one of Wittgenstein's achievements was to draw attention to context as an element of all meaning; as Strawson writes:

...the context of utterance is of an importance which it is almost impossible to exaggerate; and by "context" I mean, at least, the time, the place, the situation, the identity of the speaker, the subject which form the immediate focus of interest, and the personal histories of both the speaker and those whom he is addressing.<sup>9</sup>

In the classroom, the metaphor directs attention to the contexts of classroom speech and makes it possible to escape from one-notion, external conceptions of what teaching is or might be. If the analogy is loosely followed for its hints as to external forms, "teaching" may be seen as a game with its various plays: football has its offensive and defensive plays, and, within these broad strategies, there are various sub-plays - blocking and tackling, punting, running and so forth; each of these sub-plays has, in its turn, a series of sub-rules. If a football game were to be plotted and charted the particular plays attempted would need to be

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<sup>9</sup> P.F. Strawson quoted in Aschner, "Language and Meaning" in James B. MacDonald and Robert R. Leeper, Language and Meaning, Papers from the ASCD Tenth Curriculum Research Institute (Washington : Association for Supervision and Curriculum Development, N.E.A., 1966), p. 83.

made clear and then the chart could be built up by a composite of the plays. If this analogy is used as a stimulation for a series of reflections on classroom behavior it prompts speculations on various levels of rigour that are useful in exploring the concept "teaching." On the loosest level it is possible to identify what might be strategies, that is, offensive and defensive play - introduction, motivation, review and the like - and what might be the sub-plays, the elements that make up the strategy - the formal presentation, the recitation, drilling, seat work, the teachers response to an informal approach, talk before the period begins, and the like. No study of teaching has yet considered all of these sub-plays as parts of the game; it is as if the first and second downs and the tackle were pulled out from the football game and described, but not the punt or the half-time entertainment. Teaching, the analogy would seem to say, is a complex social activity and any study of teaching must concern itself with much more than the commonly described and analysed lecture or question-answer exchanges. In this study, some data were collected on aspects of these various games which became extremely useful in explaining some of the questions which the main focus of the study, the nature of the teacher-pupil interchange pattern in the classroom, raised.

Bellack used the "game" analogy more specifically, however, to call attention to the rules and conventions that control interaction in the classroom. Communication per se was the focus of his investigation; and communication in the classroom is controlled by a "general system of expectations"<sup>10</sup> which sets the roles and controls the use of the communication rules by the actors in the situation.

Part of the responsibility of the person playing the role of teacher is to set out the ground rules and to see that these rules are obeyed. In this sense, the teacher is expected to serve not only as coach and as one of the players but also as referee of the game. The pupil's role demands that he learn the ground rules of the game, even if these rules are not explicitly stated by the teacher.<sup>11</sup>

Working from this framework Bellack et al attempted to explore the games and types of verbal moves and the "meanings"(that is, substantive, substantive-logical, instructional and instructional-logical) that make up the particular game of the formal group lesson, group-interaction. They found that it was possible to find and make explicit a limited number of patternings of behavior, each one stable and lawful and each one involving different types of interaction between the different elements of meaning. Nevertheless the greater part

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<sup>10</sup>Bellack et al., p. 237.

<sup>11</sup>Ibid., p. 238.

of Bellack's particular conclusions was derived as a result of the empirical analysis of his data and was not expected or predicted by the theoretical framework for the study that was derived from the loose extension of Wittgenstein's "game" analogy. The only particular expectation was the concept of "rules":

Learning to participate appropriately in various kinds of language activities is very much like learning to play a game. Players have to learn the rules, the purpose of the rules, and how the various parts of the game are related. Only by learning these rules can one play the game successfully. Similarly, successful communication in various types of linguistic activities depends on understanding the language rules that give the use of words in these activities.<sup>12</sup>

Nothing more specific was predicted by the theoretical framework of the study and nothing was made available that could be used for construction of the basic empirical distinctions underlying the analysis. There was no category framework that could be used to classify the communication that was Bellack's previous concern. Nevertheless, Bellack's framework has proved to be a directly useful contribution to the empirical stages of teaching, whereas Smith's analysis has had value only as a stimulus for later, more satisfactory attempts at verbal analysis.

None of this theorizing by Bellack or Smith has solved the problem of conceptualizing teaching. Bellack's

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<sup>12</sup> Ibid., p. 3.

work has suggested a context within which a study of teaching might take place; it does not offer, however, either a basis for an understanding of the act of teaching (if there is such an act) or of what is meant by the sentence, "I teach, he learns." He was not able to use his theorizing to construct a category system that was consistent within the terms of one more embracing theory. Bellack does not and cannot derive his empirical tools from his use of Wittgenstein's work. Without a more complete theory than either of these works suggest, there is no framework within which to answer these questions or meet these objections and there is no basis for either constructive critical examination or the research conducted in the tradition of the official theory or for new approaches to analysis of the teaching act itself. The remainder of this chapter will attempt the beginnings of an exegesis of a possible category framework for a teacher's verbal communication behavior.

#### "HOW TO DO THINGS WITH WORDS"

Much of recent British philosophy has been written within a tradition in which the careful and systematic analysis of propositions has been the dominating characteristic. These philosophers seek understanding of the concepts which are the apparatus of our thinking by a careful



exploration of the behavior of words in common speech.

Speech is, one sympathetic commentator on the school has written,

subjected to the severest of all tests of efficiency, as a medium for the expression and communication of our thoughts - the test of constant use, with the potentially useful result that one can come to understand philosophically puzzling concepts by carefully and accurately noting the ways in which the related linguistic expressions are actually used in discourse.<sup>13</sup>

One of the most original and influential of the philosophers in this tradition is the late J.L. Austin who plied these techniques with great care and sharpness of eye and ear looking for the fine nuances and for small misconceptions in the use of language which might distort and complicate, unnecessarily, a view of the world.<sup>14</sup> He wrote that "words are not (except in their own little corner) facts or things: we need, therefore, to prize them off the world, to hold them apart from and against it, so that we can realize their inadequacies and arbitrariness, and can relook at the world

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<sup>13</sup> P.F. Strawson, "Construction and Analysis," in A.J. Ayer et al., The Revolution in Philosophy (London: MacMillan, 1956), pp. 103-104. See also John Passmore, A Hundred Years of Philosophy (London: Duckworth, 1957), passim.

<sup>14</sup> The linguistic movement "was associated primarily with one place - Oxford - and there it centered around one man - Austin - its most explicit advocate and most acute and wholehearted practitioner." P.F. Strawson quoted in Mehta, op. cit., p. 68.

without blinkers."<sup>15</sup> He would write after raising a problem that, "The only thing to do here, by way of avoiding misguided assimilations, is to consider numerous examples of uses of these expressions, until in the end we get the feel of the thing."<sup>16</sup> This exacting exploration of language was characteristic of most of Austin's work, but particularly of his early work. In the last years of his life, he turned - under "the pull of generality," Strawson writes - to a general classification of acts of linguistic communication, to supplement what he had learned from language with what he could learn about language to see what effects this would have on conventional and hoary philosophical problems. How To Do Things With Words was the fruit of that beginning.<sup>17</sup>

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<sup>15</sup> J.L. Austin, "A Plea for Excuses" in Philosophical Papers (Oxford: Oxford University Press, 1961), p. 130.

<sup>16</sup> J.L. Austin, Sense and Sensibilia (Oxford: Clarendon Press, 1962), pp. 33-34.

<sup>17</sup> G.J. Warnock, English Philosophy since 1900 (London: Oxford University Press, 1958), p. 154, writes of Austin's work that, "This territory has proved to be remarkably fruitful, and its exploitation powerfully disruptive of prejudices about the working of language which had long been almost instinctive in most philosophers, and damaging even in their own over-favoured field of statements. In Professor Austin's hands it provides a model, almost a pilot-project, for a kind of inquiry into the realities of speeches and language which seems likely to be long pursued and extensively developed. Nor is there any doubt that a number of wholly traditional problems in philosophy have been illuminated in the course of, or as an effect of, this kind of inquiry." See also William P. Alston, Philosophy of Language (Englewood Cliffs: Prentice-Hall, 1965), ch. 2.

In his early work Austin had pointed out that many of the statements we make, although seemingly having the appearance of ordinary, meaningful propositions designed to convey information, do not have this intent at all. Expressions like "I do (take this woman to be my lawful wedded wife)" or "I bet you a nickel it will rain tomorrow" do not describe what I am doing or state that I am doing it; to say that "I do" is not to say that I am marrying my fiancée-wife or to describe the process of marrying my fiancée-wife, but to marry her. Making utterances of this sort - Austin called them "performative utterances" - is not to say something, but to do something; they are not, therefore, "true" or "false," they do not report anything or describe anything, and the uttering of the sentence is, in fact, part of the doing of an action which would not normally be described as saying something. The standard for judgement of these statements is "appropriate" or "inappropriate" rather than truth-function. He called the statements which perform actions performatives and those which convey meaning constatives.

In How To Do Things With Words Austin attacked this distinction that he himself had made and found it wanting. He found, first, that it was impossible to be sure that any utterance is performative, and second, that there was a whole class of utterances which begin with "I state that..." "which seem to satisfy the requirements of being performative, yet

which surely are the making of statements, and surely are essentially true or false."<sup>18</sup> All statements therefore, or more explicitly, utterances, have both performative and constative force; one of Austin's examples may illustrate the problem: "I agree that ..." sometimes operates like "I approve his conduct," sometimes more like "I approve of his conduct" where it can convey information about my attitude, where it can describe my state or belief or frame of mind, and where it can be itself an act of approval. "It is time then," Austin wrote, "to make a fresh start on the problem."<sup>19</sup>

He called an utterance which has meaning and reference and sense, a locutionary act; the mental process dimension of the Ginter model would refer, at least implicitly, to one aspect of the locutionary acts of a teacher. But, to use Austin's example, it might be possible to say that "The bull is going to charge" and make perfectly clear what we were saying in issuing the utterance, but not make clear whether a warning was being given to a friend in the field. To perform a locutionary act is, therefore, "also and eo ipso to perform an illocutionary act." "To determine what illocutionary act is so performed we must determine in what way we are using the locution:

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<sup>18</sup> Austin, How To Do Things With Words, p. 91.

<sup>19</sup> Ibid., p. 91.

asking or answering a question,  
 giving some information or an assurance or a warning,  
 announcing a verdict or an intention  
 pronouncing sentence,  
 making an appointment or an appeal or a criticism,  
 making an identification or giving a description,  
 and the numerous like."<sup>20</sup> The function of the utterance is its force, and force is inseparable in principle from the utterance itself since it suggests how an utterance should be taken; to say "he is stating" is to make a statement about the force of an utterance which is as explicit and meaningful as to say "he is making a performative" or "he is judging." Illocutionary force is a basis for classification of utterances which of its nature subsumes meaning, that is, relationship to the world of facts.

Austin takes his analysis of speech acts further. To say "I tell you that..." has the illocutionary force of a statement and can be judged, as an illocution, by its appropriateness. It also has meaning and can be judged, as a locution, by its sense. But neither of these statements gives any indication of the effect of the telling on the listeners, if any. "I tell you that..., but you do not listen." Some distraction, unwillingness, doubt about the

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<sup>20</sup> Ibid., pp. 98-99.

veracity of the teller can lead the listeners to turn away.  
 However, if a speaker claims that "I convince you that..."  
 he cannot add the rider "but you are not convinced." There  
 is a third sense, then,

in which to perform a locutionary act, and there-  
 in an illocutionary act, may also be to perform an  
 act of another kind. Saying something will often,  
 or even normally, produce certain consequential  
 effects upon the feelings, thoughts, or actions of  
 the audience, or of the speaker, or of other  
 persons: and it may be done with the design, in-  
 tention, or purpose of producing them...We shall  
 call the performance of an act of this kind the  
 performance of a perlocutionary act a perlocution.<sup>21</sup>

For example:

Act (A) or Locution

He said to me "Shoot her!" meaning by "shoot", shoot and  
 referring by "her" to her.

Act (B) or illocution

He urged (or advised, ordered, etc.) me to shoot her.

Act (C) or Perlocution

He persuaded me to shoot her.

He got me to shoot her.<sup>22</sup>

The implications of Austin's analysis of language has  
 been picked up by Donald Evans in his The Logic of Self-

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<sup>21</sup> Ibid., p. 101; see also Charles Morris, Signs, Language and Behavior (New York: Prentice-Hall, 1946).

<sup>22</sup> Ibid., pp. 101-2.

Involvement<sup>23</sup> where it is suggested that every utterance is, of its nature, self-involving insofar as it has logical connections with attitudes, future conduct and feelings. A commissive utterance implies an intention, a behabitive implies an attitude, an expositive implies an attitude to the facts, the logic and the nature of the material which is brought into the exposition. Language, then, involves at least a linguistic self-involvement on the part of the person who uses the language, with the implication that a mapping of a language can give insight into the self-involving relationships contained in the language system. The mapping of a person's language can give insight into the formal and, in a sense, external world of self-involvement of a person. Evans has argued that analysis of language from the viewpoint of self-involvement can be taken further than the tentative analysis suggested by Austin and may give insight into feelings and attitudes as well as into relationships between persons and institutions.<sup>24</sup> The analysis of self-involving language is a prerequisite to the understanding and analysis of the "real" or existential involvements of a person. An analysis of how a person uses a basic language with its

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<sup>23</sup> Donald Evans, The Logic of Self-Involvement (London: SCM Press, 1963). J.D. Jenkinson suggested I look at this book.

<sup>24</sup> Ibid., chs. 2 and 3.

, implicit net of various kinds of self-involving relationships can reveal much about that person and about how he interacts with the logical world (although not necessarily the existential world) that surrounds him and encompasses him. The image that a teacher presents of himself is transmitted, presumably, by his use of language and, presumably, it is this which manifests itself first of all to his students and it is this, certainly, which students must learn.

#### THE USE OF AUSTIN'S DISTINCTIONS

In general terms this is the basis for Austin's system and one philosophical development of its implications. It offers an interesting approach to an attack on the terms "teaching" and "learning" although this task cannot be attempted here. Two issues do arise, however, and they need to be developed initially, if only to clear some ground for further structuring.

The concept of "teaching" is a difficult one to argue exactly. In one sense at least, "teaching" represents a cluster of activities and not a specific activity with a force of its own. To say "teach" implies a claim of intention and not a specific and unambiguous activity that all would recognize. To say "I am teaching Johnny Latin" can lead to the further question "How?" with the answer "Oh, I drill the declensions and conjugations but try something



, more with the verse. I hope that he gets something of Horace's use of the language." This could be mapped, at least tentatively, in this way:

<u>teach</u>	<u>learn</u>
drill	recite
tell	know
argue	convince
explain	understand
order	command
_____	_____
Illocution	Perlocution

The validity of this argument can be illustrated by reference to Austin's examples:

Act (A) or Locution

The teacher said to the class "Black is white because..." referring by "black" and "white" to black and white and by "is" to is.

Act (B) or Illocution

The teacher argued that black is white.

Act (C) or Perlocution

The teacher convinced the class that black is white.

It is possible then to sketch, at least in outline, an analysis of the teaching-learning situation in these terms although to complete the table is outside the scope of this work.

A tentative mapping of the teaching-learning concept<sup>25</sup> follows

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<sup>25</sup> See Dennis Hewish, Unpublished paper, 1966. This might represent one approach for an exploration of teaching 'games'.

TEACHER		STUDENT	
<u>State</u>	<u>Illocution</u>	<u>Perlocution</u>	<u>State</u>
Espouse	Proselytize	Convert	Espouse
Know	Explain	Enlighten	Know
Maintain	Argue	Persuade	Maintain
Understand	Explain	Clarify	Understand
Appreciate	Incite	Excite	Appreciate
Hold	Expound	Convince	Hold Accept (?)
Skill	Drill	Train (?)	Skill

An analysis of this kind can empty much of the content of meaning out of the concept "teach"; it would, seemingly, be possible to come up with a complete map which would describe and exhaust the substantive meaning from the concept and leave only a residue of meaning that embodied the intention of inducing learning in some student or group of students; to claim that "I teach" is, therefore, to make a performative claim that commits a teacher to what he is trying to do and to say "he teaches" is perhaps most basically a description of an intention. The complete explication of these possibilities is outside the scope of this work but it would seem to at least suggest the possibility of a way out of the implicit absurdity in the most extreme version of B.O. Smith's analysis, that is, that teaching can be truly studied without any reference to learning.

To say "teach" implies intention and desire; presumably it can be justifiably claimed that to say "I teach" involves a teacher in a series of complex verbal and non-

verbal utterances and actions. Insofar as to say "teach" has intentional force and insofar as the term is subsumed under yet another concept such as "education," there is a means by which a teacher can intimate that his activities have what he considers to be a worthwhile end. To say "I am teaching" does not say anything about the particular processes which are used; it does not add anything to the utterances or actions which are engaged in per se, it merely labels these as intentional and presumably desirable.

Let us say then that the teacher "tells," "explains," "argues" with his class. It is assumed that the teaching of some conventional school subject is the concern, history or English for example. Some of the teacher's behaviors will be utterances, some will not be. The efficiency of these behaviors in producing the ends that are sought will be the ultimate criterion by which the utility of these behaviors will be judged, but in asserting this it must be recognized that a desire will not, in itself, produce the perlocutionary and behavioral outcomes that one so eagerly wanted.

#### THE CLASSIFICATION OF ILLOCUTIONARY FORCE

The greater part of the last lecture in How To Do Things With Words is devoted to a lengthy exploration of the idea of illocutionary force and an attempt to list and classify some tentative general families of related and

overlapping speech acts on the basis of their force.<sup>26</sup>

Austin identified five general classes of utterance, "classified according to their illocutionary force, by the following more or less rebarbative names":

1. Verdictives;
2. Exercitives;
3. Commissives;
4. Behabitives;
5. Expositives.<sup>27</sup>

This classification is used in this study as the basis for a classification of the illocutionary acts of teachers and students in the classroom and, for this reason, each of the categories identified by Austin will be defined and illustrated here in some detail. Austin supplemented all of his definitions with lists of words (verbs in the third person) which illustrate his general classes. These lists are also given here:

1. Verdictives: typified by the giving of a verdict by a judge or umpire. An estimate, a reckoning or appraisal. A finding as to something - fact or values.

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<sup>26</sup> This area is too complex to be developed here and in all events outside the scope of the study. The outline of Austin's argument is severely limited and omits a number of important riders which Austin makes. See in particular Austin, How To Do Things With Words, pp. 103-10.

<sup>27</sup> Ibid., p. 149. See Lecture XII, passim, for the classification.

Examples are:

acquit	convict	find (as a matter of fact)
hold (as a matter of law)	interpret as	understand
read it as	rule	calculate
reckon	estimate	locate
place	date	measure
put it at	make it	take it
grade	rank	rate
assess	value	describe
characterize	diagnose	analyse

2. **Exercitives:** the exercising of powers, rights or influence. Exemplified by appointing, voting, ordering, urging, advising, warning. Passing sentence as distinct from giving a verdict.

Examples are:

appoint	degrade	demote
dismiss	excommunicate	name
order	command	direct
sentence	find	grant
levy	vote for	nominate
choose	claim	give
bequeath	pardon	resign
warn	advise	plead
pray	entreat	beg

## 2. Exercitives: cont'd

urge	press	recommend
proclaim	announce	quash
countermand	annul	repeal
enact	reprieve	veto
dedicate	declare closed	declare open

3. Commissives: typified by promising, otherwise undertaking: they commit the speaker to something but include also declarations or announcements of intention.

Examples are:

promise	covenant	contract
undertake	bind myself	give my word
am determined to	intend	declare my intention
mean to	plan	purpose
propose to	shall	contemplate
envisage	engage	swear
guarantee	pledge myself	bet
vow	agree	consent
dedicate myself to	declare for	side with
adopt	champion	embrace
espouse	oppose	favour

4. Behabitives: a miscellaneous group which have to do with attitudes and social behavior; apologizing, congratulating, commending, condoling, cursing, and challenging.

Examples are:

- a. For apologies we have "apologize."
- b. For thanks we have "thank."
- c. For sympathy we have "deplore," "commiserate,"  
"sympathize," "compliment," "condole," "congratulate,"  
"felicitate."
- d. For attitudes we have "resent," "don't mind," "pay  
tribute," "criticize," "grumble about," "complain of,"  
"applaud," "overlook," "commend," "deprecate," and the  
non-exercitive uses of "blame," "approve," and  
"favour."
- e. For greetings we have "welcome," "bid you farewell."
- f. For wishes we have "bless," "curse," "toast," "drink  
to," and "wish" (in its strict performative use).
- g. For challenges we have "dare," "defy," "protest,"  
"challenge."

5. Expositives: difficult to define; they make it plain how utterances fits into the course of an argument or conversation, how words are being used.

Examples are:

reply, argue, illustrate, tell, concede, postulate.

Here then is a list of expositives:

- |           |            |
|-----------|------------|
| 1. affirm | 2. remark  |
| deny      | mention    |
| state     | ?interpose |
| describe  |            |
| class     |            |
| identify  |            |

- |   |   |
|---|---|
| 3. inform<br>appraise<br>tell<br>answer<br>rejoin<br>3.a. ask<br><br>4. testify<br>report<br>swear<br>conjecture<br>?doubt<br>?know<br>?believe<br><br>5. accept<br>concede<br>withdraw<br>agree<br>demur to<br>object to<br>adhere to<br>recognize<br>repudiate<br>correct<br>revise | 6. postulate<br>deduce<br>argue<br>neglect<br>?emphasize<br><br>7. begin by<br>turn to<br>conclude by<br>7.a. interpret<br>distinguish<br>7.b. analyse<br>define<br>illustrate<br>explain<br>formulate<br>7.c. mean<br>refer<br>call<br>understand<br>regard as <sup>28</sup> |
|---|---|

To sum up, we may say that the verdictive is an exercise of judgement, the exercitive is an assertion of influence or exercising of power, the commissive is an assuming of an obligation or declaring of an intention, the behabitive is the adopting of an attitude, and the expositive is the clarifying of reasons, arguments, and communications.<sup>29</sup>

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<sup>28</sup> Austin's layout and numbering is retained here. The general significance of the grouping is obvious but there is no definite key to it in the extant papers. The queries are Austin's. Note in *ibid.*, p. 16; by J.O. Urmson.

<sup>29</sup> *Ibid.*, p. 162.



### CONCLUSION

It is possible to develop the implications of Austin's analysis much further than has been attempted here. Evans' extension of the analysis into feelings and attitudes has already been briefly noted.<sup>30</sup> Hewish has attempted to develop a model of classroom communication using Austin's terms.<sup>31</sup> This development, and particularly the attention to analysis of the sources of abuse, error and failure to communicate has a potentially important place in a full conception of the teaching act but one which is outside the scope of this particular study, and therefore will not be developed here.

The point that must be made in the context of this study and the field of description of teacher-pupil interaction is simply made. The Austin model, even in the fragmentary form in which it has been sketched here, offers a sounder and more complete basis for constructing interaction analyses and conceptual models of teaching than any model now available. It is a model of speech communication as such and has its base in the detailed examination of real speech situations. It thus builds on Wittgenstein's suggestion that language is "use," but rather than postulate, as Wittgenstein does, that

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<sup>30</sup> See above p. 86 ; Evans, op. cit., passim.

<sup>31</sup> Dennis Hewish, Austin's Speech Acts and Teaching, unpublished M.Ed. thesis, University of Alberta, Edmonton, 1966.

there are countless kinds of use it attempts to order these uses into a small number of defined classes. It thus implicitly gives a full and formal meaning to the suggestion that language uses differ in meta-terms that should, theoretically at least, subsume and account for other, less formal analyses of function. Austin's categories should contain many of the existing interaction category systems and thus offer a language (and a sorely needed one) that can be used to order the rapidly growing number of sets of interaction categories. It gives, for example, a rationale for Bellack's intuitive use of such categories as "substantive-logical" and explicates what B.O. Smith seems to be getting at in his so-called (but in fact not) "logic" of teaching.

There is another powerful implication of this analysis. The Austin analysis sets up talk as a social act. As such, talk is an act which can be studied in itself, as can any social action. Meaning and content are carried within this social framework and through his use of language a teacher reveals both himself and his subject. Patterns of talk can in themselves be as revealing as the content of that talk,<sup>32</sup> and language patterns can be influenced and modified by the intangibles of the total context of the communication, by the

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<sup>32</sup> For an example of this see Matarazzo, Weins and Saslow, op.cit., pp. 205-9,

various elements of the talk of one talker. Language is a completely social act and the teacher's use of language is fully and truly both a function of, and a contribution to the social and dynamic world of the classroom and of the social and cultural system which the school presents to its students. Talk, the spoken language is one crucial element in the transmission of the different elements which the school expects to transmit. These social behaviours are, therefore, of vital importance and, willy-nilly, are learned. Processes of social learning can, presumably, be applied to language-learning; and, as Bandura writes of social learning in a context of psychotherapy:

Most conceptualizations of psychotherapy as a learning process depict the therapist as a source of reinforcements that can be manipulated in a contingent manner so as to develop and to maintain the client's behavioral repertoires. However, relatively little attention has been paid to the importance of therapeutic agencies as a source of behavioral repertoires. The laboratory studies reviewed. . . demonstrate clearly that the provision of models can be an exceedingly effective method for transmitting entire behavioral repertoires, for disinhibiting or inhibiting existing responses patterns, or for serving as discriminative or response facilitative stimuli.<sup>33</sup>

Language is then a variable to be studied in its own right as a source of understanding of some of the elements of

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<sup>33</sup> Albert Bandura "Behavioral Modifications through Modeling Procedures," in Krasner and Ullman, op. cit., p. 339.

the instruction and learning, but one we know next to nothing about. Austin's work gives us this understanding and gives a set of basic distinctions that can be used to explore some of the ramifications of our understanding. It permits the whole enterprise (of which this study is only one small part) to be put into some meaningful and satisfying perspective. Here only his meta-language of families of speech acts is used.

## CHAPTER IV - THE DEVELOPMENT OF THE CONTENT ANALYSIS SYSTEMS

Two concerns controlled much of the direction of search for, and the development of, the content analysis systems used in this study. It seemed important, in the first place (and this thinking dominated the study until its very last stages) to include in the complete battery instruments devices that would explore what were thought of as the two dimensions of the Ginther model - although in making this decision it was known that the cognitive dimension would present difficulties. In addition teaching is a little understood activity. There seemed a role for less intensive analysis systems than the transcript-based systems of B.O. Smith and Bellack that were more exacting and precise than any existing rating scale, but which would permit comparatively rapid analysis of such gross units as school periods.

Flanders' method of direct coding of actual teaching periods or the logical alternative of coding of tapes of actual teaching periods using a time grid rather than logical or pedagogical units seemed a most promising point of departure. No cognitive system coded directly from tapes, seemingly a more feasible method than direct observation in the classroom, existed and the most difficult problem of both the

pilot phase and the actual data collecting phase of the study was to develop such a system. The problems of the procedural dimension were solved first and will be discussed briefly before the application of the Austin concept of illocutionary force is considered.

### THE AMIDON-HUNTER VERBAL INTERACTION

#### CATEGORY SYSTEM

The Amidon-Hunter Verbal Interaction Category System which was the basis for the code used to analyse the procedural dimension in this study is a modification of the Flanders' system that was discussed above. It employs the time grid basis for coding of the original and is amenable - in the same way as is Flanders' system - to Markov analysis; it contains the distinctive preservation of some of the sequence of behavior in the classroom which is the most original feature of the Flanders' work. However, Amidon and Hunter have shifted the emphasis of their instrument away from the uncertain "directness," "indirectness" of the original system towards a different concern with "initiation and response."<sup>1</sup> The system is set out in Figure 6.

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<sup>1</sup> Amidon and Hunter, Verbal Interaction in the Classroom: The Verbal Interaction Category System, p. 7.

FIGURE 6

THE VERBAL INTERACTION CATEGORY SYSTEM (VICS)\*

- Teacher-initiated Talk
1. Gives information or opinion: presents content or own ideas, explains, orients, asks rhetorical questions. May be short statements or extended lecture.
  2. Gives direction: tells pupil to take some specific action; gives orders; commands.
  3. Asks narrow question: asks drill questions, questions requiring one or two word replies or yes-or-no answers; questions to which the specific nature of the response can be predicted.
  4. Asks broad question: asks relatively open-ended questions which call for unpredictable responses; questions which are thought-provoking. Apt to elicit a longer response than 3.
- 
- Teacher Response
5. Accepts:
    - (5a) Ideas: reflects, clarifies, encourages or praises ideas of pupils. Summarizes, or comments without rejection.
    - (5b) Behavior: responds in ways which commend or encourage pupil behavior.
    - (5c) Feeling: responds in ways which reflect or encourage expression of pupil feeling.
  6. Rejects:
    - (6a) Ideas: criticizes, ignores or discourages pupil ideas.
    - (6b) Behavior: discourages or criticizes pupil behavior. Designed to stop undesirable behavior. May be stated

in question form, but differentiated from category 3 or 4, and from category 2. Gives direction, by tone of voice and resultant effect on pupils.

(6c) Feeling: ignores, discourages or rejects pupil expression of feeling.

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Pupil Response

7. Responds to teacher:

(7a) Predictably: relatively short replies, usually, which follow category 3. May also follow category 2, that is, "David, you may read next."

(7b) Unpredictably: replies which usually follow category 4.

8. Responds to another pupil: replies occurring in conversation between pupils.

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Pupil-initiated Talk

9. Initiates talk to teacher: statements which pupils direct to teacher without solicitation from teacher.

10. Initiates talk to another pupil: statements which pupils direct to another pupil which are not solicited.

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Other

11. Silence: pauses or short periods of silence during a time of classroom conversation.

12. Confusion: considerable noise which disrupts planned activities. This category may accompany other categories or may totally preclude the use of other categories.

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\* After Amidon and Hunter, op. cit. See also Edmund Amidon and Elizabeth Hunter, Improving Teaching (New York: Holt, Rinehart and Winston, 1966).



The instrument divides the single "Asks questions" category of the Flanders' system to differentiate between questions eliciting predictable responses and those which elicit unpredictable responses, "those which are broad and those which are narrow in scope."<sup>2</sup> It divides Flanders' two categories of student talk into five, distinguishing between conversations which the student has with the teacher and the conversations that he has with other pupils, responses which are predictable and those which are not, as well as maintaining the original distinction between student talk with the teacher which is initiatory and that which is not.

The revision of Flanders' system was used initially in this study. However, in this use it appeared less satisfactory than it seemed on the basis of inspection and trial use. While the difference between "asks narrow question" and "asks broad question" did seem to reflect some aspects of the reality of classroom life, the category "responds to teacher unpredictably" was difficult to distinguish from "talk to teachers" and the categories "responds to another pupil," "accepts behavior," "accepts feeling," "rejects behavior," "rejects feeling," and "rejects ideas," occurred so infrequently that there were usually too few entries in the matrices to permit statistical analysis. The categories

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<sup>2</sup> Ibid., p. 7.

, finally used for procedural analysis are set out in Figure 7. Those not used were collapsed by the computer program used in the final analysis of the data.

FIGURE 7CATEGORIES FOR PROCEDURAL SYSTEM

## Teacher:

1. Presents information or opinion: gives facts or opinions about content or procedures; explanation, rhetorical questions, teacher contributions to discussion; teacher reading from text or reference is included under this heading.
2. Gives direction: directions, orders, instructions, or commands to which the class or individuals are expected to comply.
3. Asks tightly controlling question: teacher questions when it seems possible for an observer to predict the reply that the teacher expects.
4. Asks freeing question: open-ended questions; questions whose answer cannot be predicted or which do not seem to imply a specific answer.
5. Accepts ideas: statements which commend a student or students for their contributions to discussion or for their ideas.
6. Accepts behavior: statements which commend a student or students for their behavior; statements which encourage student to continue.
7. Rejects ideas or behavior: statements which criticize or rebuke students for behavior or which reject ideas or contributions.

## Student:

8. Responds to teacher: student answers to questions asked by the teacher; student responses which are consistent with the theme or intent of the teacher; student reading from a text or reference.
9. Talks to teacher or another pupil: statements initiating a conversation, a theme, or a direction of behavior or thought from the teacher or another pupil, whether as a response to a question or without prompting.
10. Silence or confusion.

THE DEVELOPMENT OF THE FORCE ANALYSIS SYSTEM

The reasoning and concerns which lay behind the development of the Force Analysis System have been described above. The instrument came out of a search for a means of investigating the "mental process" dimension of the Ginther paradigm that was consistent with the condition that it must be possible to code along this dimension directly from tapes without an intermediate stage of transcription. The use of Austin's concept of the illocutionary force of an utterance was a result of difficulties posed by using a set of categories, such as had been initially hypothesized, based on some taxonomy of cognitive functioning that reflected the terms "higher" and "lower" used in the original model. It seemed in the pilot stage that too many of the utterances that had to be classified were, in the terms of this set of categories, "procedural" yet were clearly different one from the other. The conception of "higher mental process statements" proved not at all viable. At this point it seemed that a new basis that was still seen as a "cognitive" classification was needed. At this point illocutionary force seemed to offer a conceptual means of exploring something that could be seen not so much as the mental process induced in the hearer by the utterance but as the process of the utterance itself and quite different from the simple implication of "procedure" that the Procedural System seemed to code.

A number of attempts were made to use various analytic codes. For some time the attempts of Soskin and John to explore the functional aspects of spontaneous talk seemed to offer a useful basis but this system did not offer a way of getting at the concept type of expository talk that the "mental process" conception seemed to require.<sup>3</sup> This problem was apparently solved in part by the concepts developed in How To Do Things With Words; illocutionary force seemed a richer way of conceptualizing talk and offered a way of getting at the idea, implicit in the Ginter dimension, that there were differences that were in some way analogous to "mental process" in expository talk. Illocutionary force was, in addition, something that could be directly scored from tapes.

Austin's five major categories were used as starting-points:

1. Verdictives;
2. Exercitives;
3. Commissives;
4. Behabitives;
5. Expositives.

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<sup>3</sup> William F. Soskin and Vera P. John, "The Study of Spontaneous Talk", in Roger G. Barker, editor, The Stream of Behavior (New York: Appleton-Century-Crofts, 1963).

, Doubled over, with one set for teachers and another for students (and without making any attempt to distinguish between students) this list made a basic set of ten categories. However, this basic list seemed to leave the class of expositives in the somewhat ill-defined position they had in the John-Soskin structone category, seeming to cut off analysis at the point at which it might become interesting. Austin's further grouping of the class expositives was used, then, as the basis for subdivision of the fifth category. Initially four divisions were used:

- a. Inform: including Austin's words, inform, appraise, tell, answer, rejoin, remark, mention, interpose, affirm, deny, state, describe, class, identify.
- b. Conjecture: including testify, report, swear, conjecture, doubt, know, believe, accept, concede, withdraw, agree, demur to, object to, adhere to, recognize, repudiate.
- c. Postulate: including postulate, deduce, argue, neglect, emphasize.
- d. Illustrate: including interpret, distinguish, analyse, illustrate, explain, formulate.

This seemed to offer a reasonable interpretation both of Urmson's footnote<sup>4</sup> and of the categories of talk that seemed to emerge from the attempts at preliminary analysis of the tapes. Subsequently Austin's category "3/a ask" was incorporated as a separate category of "questions."<sup>5</sup>

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<sup>4</sup> See above, pp. 94-95.

<sup>5</sup> See David Harrah, Communication: A Logical Model (Cambridge, Mass.: The M.I.T. Press, 1963), Chs. 6, 7.

These groupings made an initial listing of eighteen categories; a nineteenth to cover silence, laughter, confusion and the like was added to make up an initial listing that was used in the first analysis of the tapes. This list and the numbers assigned to each are set out in Figure 8.

The use of these theoretically derived categories presented difficulties. Student and teacher reading of references or texts had to be assigned quite arbitrarily to categories 5 or 14 respectively, although these categories do seem to reflect the illocutionary role of these activities. The decision to use category 7, "argues," as the heading under which to classify "extended argument" where the teacher outlines the way an argument would or does go without necessarily committing himself to or supporting the position that is presented was a less soundly based judgement. Both of these were however comparatively unimportant and infrequent activities so that perhaps arbitrary use of these categories is, in the total analysis of data, unimportant. Other categories were more difficult to distinguish. Category 3, "commissive" and category 5, "inform" were seemingly close together. Once or twice a teacher did say "Alright, I promise to do that tomorrow" or "I promise I will give you a work period (or a discussion period) next Friday," and made it easy to use category 3; more often, however, it was difficult to decide whether or not there was a clear and unequivocal

FIGURE 8INITIAL CATEGORIES FOR FORCE ANALYSIS INSTRUMENTTeacher Behaviors:

1. Verdictives: Teacher gives a verdict or judgement as to the truth or the correctness of a fact, statement, or action.
2. Exercitives: The exercising of his power or right by the teacher; the giving of permission to students to act or talk in certain ways; telling students what they will do.
3. Commissives: The teacher promises he will do something or outlines his intentions in a way that binds him to certain actions.
4. Behabitives: The teacher approves and commends or disapproves and rebukes by the statements he makes; venting of feeling by teacher.
5. Informs: The teacher gives information to the class; narrates events or facts to the class; repeats answers of students to inform class and without implying approval or disapproval; teacher reads from text or reference to the class.
6. Conjectures/testifies: The teacher gives a personal opinion to the class; testifies to the class about his opinion or reaction.
7. Argues/deduces: The teacher argues rather than explains; presents arguments in an ordered form - premise and then conclusion. Teacher presents an extended argument from another source to the class for a didactic purpose.
8. Illustrates/defines/explains/analyses: The teacher explains reasons, facts, or argument to the class. Explains the meaning of a term or concept.
9. Questions: The teacher asks a question of an individual or the class; the category does not include rhetorical questions.



Student Behaviors:

10. Verdictives: Student gives judgement as to the truth or the correctness of a fact, statement, or action.
11. Exercitives: The exercising of social power by the student; telling students or teacher what they will or should do.
12. Commissives: Students commit themselves by promises or implication to do certain things or behave in certain ways.
13. Behabitives: Venting of feelings by a student; apologizing, thanking by the student.
14. Informs: A student gives the class information, narrates events, replies factually to a question, reads from a text.
15. Conjectures/testifies: Student testimony as to his belief or opinion about something; - "I believe that . . ."
16. Argues/deduces: Student argues with teacher or another student; a case or point is presented syllogistically.
17. Illustrates/defines/analyses/explains: Student explains reasons for certain actions or events; explains the meaning of concepts or terms.
18. Questions: Student asks questions either of teacher or other students.

All participants:

19. Silence or confusion:

commission. Again, however, these were infrequent behaviors and thus presented no large-scale difficulties.

Only one of the major categories presented substantial and, in a sense, unresolved problems. It was difficult to distinguish between the original category 5, "teacher informs," and category 8, "teacher explains," category 14, "student informs" and category 17, "student explains"; yet clearly it was important, as it was not in other cases, to make a distinction between these categories. They were both theoretically important, indeed crucial and in the practical application of the context of this and other studies, potentially major areas of difference between teachers and classes.

In many instances there was no difficulty in making the distinctions:

- T. We can only alter our constitution in purely federal matters. They can amend their own constitution although it's a very difficult procedure. Very few amendments have occurred in the United States. How many? Fifteen amendments? . . . .
- S. And a procession of scandals.
- T. One could ask whether the government should be spending time on this. Well, anyway, one Conservative said, I read, he said that the country, the people of Canada, want to get down to the bottom of this whole thing and we're going to get right down to the bottom of this and see whose been sleeping with whom type-of-thing. (laughter) There have been two articles that are important. Section 91 and section 92. Can anyone tell me which powers this one had to do with? Federal or provincial? No? It's probably a good thing to know. Section 91 is federal; it's federal powers. Section

92 is provincial. And I always remember section 93 in our act which gives education to the provinces, you see. This is a provincial responsibility. This then . . . there are sixteen powers here and what, twenty?<sup>6</sup>

There are, of course, a number of sentences (and consequently scored codings) that fall into neither category 5 nor category 8 but, for illustration, it is enough to say that the informing-explanatory material here can all be classified without difficulty as 5, "informs." There was no difficulty in classifying the following extract as, where appropriate, category 8, "explains":

T. The reason is that the president is elected on a different ballot. People in the United States, within each state, say, will elect Republican or Democrat electors for the electoral college. If we elect Democrat electors, then they will go and choose Johnson. And then they say we are also going to elect senators and congressmen, or House of Representatives men. O.K. -- Now, the situation here is different. The people elect members from constituencies. The person who becomes prime minister, where does he come from? Another constituency. You see. He is just an ordinary constituency man. This man is voted into power by the whole country. So that a prime minister gets his job, as somebody was saying, by being the leader of the winning party. You see, this leader of the winning party -- he chooses his cabinet -- Now, then this whole business of responsible government comes into the picture.

Often, however, there was difficulty in making a clear assessment on the basis of the sentences or of the

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<sup>6</sup> Extract from R.S.S. 30. For complete transcript of this period see Appendix A.

nature of the individual facts or discrete sentences of the narrative or exposition. Each of the single facts and each of the single sentences might be best classified as informing, but in combination the overall emphasis of the exposition might be explanatory. Thus the teacher's explanation might be an "explanatory narrative."<sup>7</sup> In these cases and others unless where there was doubt the communication was classified as "explains."

The student-initiated categories were more difficult to work with. The different and complementary role of the student in the classroom was marked by both reduced opportunity to talk and participate and a qualitatively different range of seemingly possible contributions to the general pattern of talk. Thus, in the context of the classroom, students had little or no opportunity to utter verdictives or to show evidence of social power by the use of exercitives. On the whole, students have no overt social power in the formal dialogue of group interaction (although they well might in the less formal talk of the individual-interaction situation where the teacher talks in hushed voice to individuals when they are at their desk) and consequently

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<sup>7</sup> For a discussion of this problem in the context of the philosophy of history although without any reference to Austin's concepts or terminology, see W.B. Gallie, Philosophy and The Historical Understanding (New York: Schocken Books, 1964), Chs. 2-3.

little opportunity to commit themselves or vent their feelings through verbal behavior. In fact it seemed that when students did make statements of this type in the group interaction situation the conventions and informal rules of the classroom were breaking down and once, in a context of this behavior, it seemed to the observer that the teacher was not "teaching" but had changed or perhaps withdrawn his active involvement from the lesson. There was no difficulty in recording statements that were verdictives, commissives and the like, whenever they occurred, but as a rule there were none of these statements. The categories of statements that suggested social power (that is, seemingly the import of verdictives, commissives, behabitives and exercitives) was non-functioning; the only expedient seemed to be to bracket this general class with the category B, "questions" which seemed to indicate, if not overt social power, at least a modified social or cognitive power. Questions and power statements were linked therefore into a general category B, "Questions and power statements"; the remaining student categories were retained as revised categories 9, 10, 11 and 12.

THE REVISION OF THE FORCE SYSTEM

The statistical analysis of classroom communication presents certain theoretical difficulties which have required the use of Markov techniques that are not widely known. The particular test used in this study is discussed in detail in Appendix B. The use of this statistic for analysis required that there should be no non-functioning rows or columns in the data entered into analysis; this requirement imposed limitations on the analytic system that was eventually adopted as the primary tool for this phase of the study and dictated a collapsing of the theoretically-derived nineteen categories of the original system discussed above to produce a smaller, but potentially more statistically useful set of thirteen categories. Some sample original matrices are set out in Appendix F; these matrices demonstrate the need for this reduction in the number of categories.

The teacher-initiated categories of the original system needed comparatively little modification. The overwhelming proportion of teacher talk<sup>8</sup> found in the classrooms and the teacher's dominating role gave the teachers observed the opportunity to use more varieties of talk and to range fairly widely through Austin's categories. Most teacher categories in the original system were therefore recorded and did occur widely, although "commissives" and "behabitives"

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<sup>8</sup> See also Bellack, et al., pp. 43-52.

were much less common than any of the others. These categories were therefore eliminated by combination with others; "behabitives" were combined with "exercitives" and "commissives" were combined with "informs." In both cases it was difficult to be confident about separation of the minor category from the one it was bracketed with and this impression justified the combination that was adopted.

### THE REVISED FORCE CATEGORY SYSTEM

#### Teacher Behaviors

1. Verdictives: teacher gives a verdict or judgment as to the truth or correctness of a fact, statement, or action.

Example:

S. Well there's cabinet ... similar in both.

T. OK, there is a similarity.

S. There's differences that, ah, the president doesn't necessarily represent the party that puts him in \_\_\_\_\_ in other words....

T. That's not quite it.

(The underlined sentences illustrate the behaviors).

2. Exercitives/Behabitives: the exercising of his power or right by the teacher; the giving of permission to the students to do something, to act or talk in certain ways; teacher statements commending or rebuking, venting of feeling by the teacher.

Example:

S. The Republican and \_\_\_\_\_

T. Beg your pardon.

\* \* \* \* \*

T. Are you with us here?

S. Ah ha.

T. Good. So you can list off a whole bunch of contrasts, bang, bang, bang.

S. Now?

T. Yes.

\* \* \* \* \*

T. I'd like you to give me some names of songs you know about love. Give me the names of some songs. O.K..

\* \* \* \* \*

T. Now I'll have volunteers to answer this one because it's quite open-ended.

\* \* \* \* \*

T. What are you boys playing at?

3. Commissives and inform: the teacher promises he will do something; teacher outlines his intention in a way that binds him to certain actions; teacher gives information about subject or about procedures for the day; narrates events or facts to the class; repeats the answers of students to inform class and without implying approval or



disapproval; teacher reads from text or reference to the class.

Example:

T. Last day I put down, on the board, the following heading.... (teacher writes on board and says) The Seven Years' War. Military Occupation.

\* \* \* \* \*

T. After I won't even so much, I promise, reprimand you in class.

\* \* \* \* \*

T. This morning I wanted to continue our discussion for a few minutes before the film.

\* \* \* \* \*

T. The federal government has through the interpretation of the courts developed considerably more power than the doctrine of the States' Rights and residual power going to the states would suggest. But this is a development. The point is that constitutionally our federal government is big, tough, strong and constitutionally their state governments are big, tough, strong with lots of authority.

\* \* \* \* \*

T. No. Keep in mind the national, Canada's national oil policy (unfolds map of Canada) divides right at the Ottawa River. So Venezuelan oil comes in here and serves the eastern part of Canada. Our oils come down here to the Ottawa River valley.

4. Conjectures/testifies: teacher gives a personal opinion to the class; testifies to the class about his personal opinions or reactions.

Example:

T. I sometimes get excited. I even say, you know, one of the reasons that there is quite a bit of apathy - of course there's apathy in other places in Canada but I'm told there's not quite as much as there is in Alberta - because all you're supposed to do in this province according to the philosophy of Social Credit is to elect them and let them worry about it. As long as you get results it's alright. This is, I think, part and parcel of Social Credit philosophy which I don't agree with.

\* \* \* \* \*

T. Section 91 is federal; it's federal powers. Section 92 is provincial. And I always remember Section 93 in our act which gives education to the provinces.

\* \* \* \* \*

T. I think you are probably quite right about those who have expressed an opinion about our problem with the United States. Mind you, I kind of like the direction he's suggesting that we go in our foreign policy. Wouldn't it be good if we could say to ourselves -- and this would be a basis for nationalism too - a nationalism based on service of some kind. We should say we hope to help. Mind you, I think this is a good basis for nationalism, rather than the self glorification that you usually think of. "We are a great people." We would have something distinctive about us that would commend us.

5. Postulates/argues/deduces: teacher argues rather than explains; presents arguments in an ordered form - premise and then conclusion; teacher presents an extended argument from another source to the class for didactic purposes.

I heard a discussion on View-point, I think it was, I believe it's called View-point, after the news this morning. A talk on Canadian Foreign Policy, and this guy was saying that this crisis in NATO has really got us buffaloed in Canada because we tend first of all, to support NATO which is supposed to be containing Communism. On the other hand we support and agree to, the sale of wheat to Red China. We are not going one way or the other as far as Viet Nam is concerned. You know, Viet Nam is the containment of Communism, if it really is this, and this is what the United States is doing there then we are not involved. There is this contradiction, if we support NATO and in NATO, France is indicating that it's going to drop out of NATO. Now, what do we do with that! France is an ally, do we support France, or do we support NATO? What this fellow was pointing out was that we seemed to be riding many horses. The only problem is they are riding in several directions at once, and so there might be a point in which we might have to decide exactly what we are going to do as far as our foreign policy is concerned, for example, are we going to support the U.S. in Viet Nam, rather than the U.N.

6. Illustrates/explains/analyses/defines: teacher explains reasons, facts or argument to the class; explains the meaning of a term or concept.

Example:

T.H'm. Well I'm sure this operates. Then of course you've got this problem here in our country where you've got a conflict of loyalty between what your constituents want - the people back home you know - and what the party wants perhaps. And if you've got that which way do you go. Or you might have your own principles at stake like Doug.Harkness, whose principles were at stake when we got atomic warheads on our - when we refused to accept atomic warheads for our Bomarc missiles. The Conservative

government refused this, you see, and Harkness resigned rather than sticking with a government which would do this -- so, -- the whole point is, of course, that in our system loyalty is extremely important and you've got party whips to keep whipping you into shape, you know. Now over here party loyalty is not so significant so we've got this business of responsible government, you people, this is the part of our constitution which is not written down. It's the Parliamentary system, it's the cabinet system, as it is variously called, it is not written down. This is part of the unwritten constitution that we have. Are you with us here?

\* \* \* \* \*

T. Twenty-six powers in here. Now the whole point is that in this particular section -- the introduction to Section 91 -- it states that the federal government shall have power to provide for peace, order and good government for the country and they also go on to some indication of what residual power -- the federal government has residual power [writes on board] residual power. And they have the power to provide peace, - order, - and good - government - for Canada. Now I mention this particular one because with residual power, with the veto power, with this statement here which is a bit vague -- it seems that the federal government has got considerable power but there is one stickler here and this is the clause in the provincial group of powers - property - and with civil rights [writes this on board]. The provincial government shall have power to..ah -- well it has the power over, I should say, property and civil right. Now. The courts have taken a look and any argument that has occurred here and most arguments that have occurred between the two -- now they would have arguments because the question would always be where does the provincial government's authority end and the federal government's begin? So there is bound to be arguments wherever you have a division of powers under a federal system. You can understand this! So what has happened is that where there has been arguments the courts have interpreted this very broadly -- this one here [pointing] and

they have included, therefore, a great many things under property and civil rights and have narrowed the federal government's power in their interpretation of the B.N.A. Act. The court in question here is the British court: the Judicial Committee of the Privy Council.

7. Questions: teacher asks a question of an individual or of the class; includes both questions which have a predictable response and a response which cannot be predicted or anticipated. The category does not include rhetorical questions.

Example:

T. The greatest storehouse of industrial minerals?

\* \* \* \* \*

T. What laws exist in your home?

Student behaviors:

8. Power statements: verdictives, exercitives, or behabitives by students. Questions: student asks question either of teacher or other students.

Example:

S 1. And then when you turn thirteen you feel one of the big group.

S 2. We're still children. - - - - (Verdictive)

\* \* \* \* \*

S. Well, judging by past history one is bound to be a Democrat or a Republican. Well say some person some sort of independent ran and was elected president and then went Democrat in the House and Republican in the other. What would happen? How would they work it out?  
 . . . . (Question)

9. Informs: student gives class information, narrates events, replies factually to a question, reads from a text or reference.

Examples:

T. Nickel and nickel refineries. Just the regions here please, not the industry, alright. Casea, Gordon?

S. Oh, that's . . .

T. Beg your pardon?

S. Asbestos.

T. Asbestos. Chamberville? Gay.

S. Iron.

T. Iron. Swan Hills? Gary.

S. Oil.

T. Oil - and?

S. Gas.

T. Gas. Where's the terminal of the inter provincial pipeline? Betty-----Beg your pardon?-----  
Alright, Randy-----

10. Conjectures/testifies: student gives a testimony as to his beliefs or opinions about something.

Examples:

S. You don't want to be exactly an adult - but you sure don't want to be a kid.

\* \* \* \* \*

S. I myself, I myself, I felt a little different, like - under thirteen you hear a lot about teenagers, you hear the word teenager so often, but you don't hear the word child so much. And then when you turn thirteen you feel one of the big group.

11. Postulates/deduces/argues: student argues rather than explains; presents a case in an ordered form. Student presents an extended argument from another source for didactic purposes.

Examples:

S. In a sense, isn't the American way a little better because in Canada we find that, say with the experience of minority government for a whole year as we have for the last 5 years we find that parties in power are reluctant, with their minorities, to pass controversial legislation that might bring the downfall of the government. And that's the position in Canada -- this is a sort of a political football -- they're scared to try and think of this, and therefore lots of legislation can't get past, but in the States there's lots more.

\* \* \* \* \*

S. Well, what about that case in Alabama with Wallace? Well, how come he stood up. I mean if the federal government has so much power how could he go along for so long.

T. I'm saying that in the States the States have residual power.

S. Well that's just what I'm saying. But the federal are supposed to be more powerful than the states.

12. Illustrates/explains/analyses/defines: student explains reasons, facts or arguments to the class; explains the meaning of a term or concept.

Examples:

S. Well it's having extra cash for various activities, a car. It's extra cash that's giving young people responsibility -- and trusting them before they're

anywhere near ready for it. They want this responsibility, they want the good things that go with it, but they don't want to be tied down by the restrictions.

\* \* \* \* \*

T. First of all, what are we talking about when we talk about culture? Gaill -- Lyn . . .

T. Any other examples? Colin?

S. Well we've got out West . . . we've got things . . . Oh I was thinking of Klondike days.

T. But Klondike days, it isn't Culture.

S. I know. But I was thinking of gold-rushes and Klondike. Well, couldn't you call that a kind of culture?

T. Well there are two kinds of culture. . .

Teacher and Student Behaviors

13. Silence or confusion:

#### THE CONSISTENCY OF CODING

To be of any use it is essential that it is possible to code, according to the conventions of these systems with reasonable consistency between observers. Without some criterion of this type being met results from any content analysis of the type undertaken here would be totally subjective and empirically worthless. Although checks undertaken at the stage of development of the systems suggested that it was possible both to code tapes consistently and to teach others to use the systems formal testing of consistency



FIGURE 9THE REVISED FORCE CATEGORY SYSTEM

## Teacher:

1. Verdictives: teacher gives a verdict or judgment about the truth or correctness of a fact, statement, or action.
2. Exercitives/Behabitives: the teacher's exercising of his power or right; the giving of permission to the students to do something, to act or talk in certain ways; teacher statements commending or rebuking; the venting of feeling by the teacher.
3. Commissives and informs: the teacher promises he will do something; teacher outlines his intention in a way that binds him to certain actions; teacher gives information about subject or about procedures for the day; narrates events or facts to the class; repeats the answers of students to inform class and without implying approval or disapproval; teacher reads from text or reference to the class.
4. Conjectures/Testifies: teacher gives a personal opinion to the class; testifies to the class about his personal opinions or reactions.
5. Postulates/Argues/Deduces: teacher argues rather than explains; presents arguments in an ordered form - premise and then conclusion; teacher presents an extended argument from another source to the class for didactic purposes.
6. Illustrates/Explains/Analyzes/Defines: teacher explains reasons, facts, and arguments to the class; explains the meaning of a term or concept.
7. Questions: teacher asks a question of an individual or of the class; includes both questions which have a predictable response and a response which cannot be predicted or anticipated; the category does not include rhetorical questions.

**Student:**

8. Power statements: verdictives, exercitives, or behabitives by students. Questions: student asks question either of teacher or other students.
9. Commissives and informs: student gives class information, narrates events, replies factually to a question, reads from a text or reference.
10. Conjectures/Testifies: student gives a testimony as to his beliefs or opinions about something.
11. Postulates/Argues/Deduces: student argues rather than explains; presents a case in an ordered form; student presents an extended argument from another source for didactic purposes.
12. Illustrates/Explains/Analyzes/Defines: student explains reasons, facts, or arguments to the class; explains the meaning of a term or concept.
13. Silence or confusion.

had to be undertaken.

The coding procedures used in this study made it unnecessary to station several coders in classrooms, in order to investigate coding consistency. However, as the tapes were coded, it was necessary to check first the consistency over time of the scorers and then to check whether or not it was possible for others, not involved in the development of the system, to learn and use the category systems. It is possible that a developer-scorer, or even a group of developer-scorers, might be able to score their own system consistently when measured against themselves, but that the system being used remain for all intents a private language, albeit a consistent private language, unknowable to others.

Inter-rater checks were made in the course of this study to measure both of these concerns using the coding conventions described in Chapter 5. The measures are termed here tests of observer consistency. The criteria were computed over a randomly chosen sample of periods using the Darwin statistical analysis described in Appendix B and recommended by Wightman and Snider and test of consistency to be preferred.<sup>9</sup> Criterion tests were made both on the scoring

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<sup>9</sup> Lawrence Wightman and Roy M. Snider, "Observer Reliability in Interaction Analysis." Abstract in A.E.R.A., Abstracts of Papers, Chicago 1966, p. 55. The procedures in this coding were those described in Ch. 5.

of the principal observer-scorer and on an inter-rater basis. The results obtained are reported in Tables 2, 3, and 4. It is difficult to fix standards for acceptable consistency coefficients for, as Oliver and Shaver point out, "whether one demands a correlation of .70 or .90 is contingent upon the uses to which the observational scores are to be put."<sup>10</sup> The Darwin analysis used here produces the standard z-score and can be evaluated using the normal probability criteria. Probabilities are reported and may be judged satisfactory.

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<sup>10</sup> Oliver and Shaver, op. cit., p. 223.

T A B L E 1

## TESTS OF CONSISTENCY (DARWIN'S METHOD)

## INTRA OBSERVER (PRINCIPAL SCORER)

## PROCEDURAL

Period	Chi-square	<u>df</u>	<u>z</u>	<u>P</u>
1	44.095	90	-3.988	>.9999277
2	32.856	90	-5.273	>.9999997

T A B L E 2

## TESTS OF CONSISTENCY (DARWIN'S METHOD)

## INTER OBSERVER

## PROCEDURAL

Scorer I

Period	Chi-square	<u>df</u>	<u>z</u>	<u>P</u>
1	48.642	90	-3.516	>.99984
2	49.767	90	-3.402	>.999663

Scorer II

1	34.241	90	-5.104	>.9999997
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T A B L E 3

## TESTS OF CONSISTENCY (DARWIN'S METHOD)

## INTRA OBSERVER (PRINCIPAL SCORER)

## FORCE

Period	Chi-square	df	z	p
1	60.161	156	-6.666	>.999999
2	70.326	156	-5.775	>.9999999

T A B L E 4

## TESTS OF CONSISTENCY (DARWIN'S METHOD)

## INTER OBSERVER

## FORCE

Scorer I

Period	Chi-square	df	z	p
1	57.688	156	-6.899	>.9999999
2	104.962	156	-3.146	>.9986501

Scorer II

1	84.492	156	-4.636	>.9999966
2	115.578	156	-2.431	>.9924506

Scorer III

1	66.752	156	-6.081	>.9999999
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## CHAPTER V - METHODS AND MATERIALS

The previous chapters have described the conceptual development and the instruments that were devised to explore the classroom behavior of teachers in situ. The balance of the study will describe the tentative application of these procedures to a small number of class periods of a group of high school social studies teachers. The successful application of the analytic tools is the sine qua non of the viability of the analysis and instruments described above. To this point the usefulness of the techniques has been implicit in the discussion; the balance of the study will demonstrate some of the problems of this application. This chapter will discuss the group of teachers whose behavior was observed and the methods of analysis used. The remaining chapters will describe the results obtained.

This study was conducted using teachers and pupils from one large composite high school in a Western Canadian city.<sup>1</sup> The plan for this study called for a group of three graduate specialists in the teaching of social studies with degrees from the provincial university to be observed

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<sup>1</sup> Composite high school is used to refer to a large multi-purpose vocational and academic high school serving grades 10 to 12. The school used in this study had over 2,400 pupils and had a large vocational and technical wing.

teaching social studies to a group of three different grades. Only two high schools in the city seemed to have large enough staffs to make such a selection possible and the school in which the study was completed was chosen because of its convenience for the researcher. After consultation with the School Board an approach was made to two teachers who were known to the investigator through an association with the university student teaching program. The third teacher was introduced to the investigator by one of these two teachers. Three other teachers in the school were approached but were unwilling to take part in the investigation. A fourth was unwilling to take part "at the time." The selection of the classes to be observed was made by the teachers participating in the study.<sup>2</sup>

It should be noted that the group of teachers chosen for observation was not thought of in the planning as a sample from any specified population of teachers. In terms of training and experience these teachers were not representative of the general teaching force; they were, in addition, self-selected and encouraged to volunteer because of their accessibility to the investigator. Four other

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<sup>2</sup> It is likely that the teachers chose classes which were 'teachable' for the purposes of observation. One teacher remarked, "I'd rather not see you with them." Another, "They are a dull group. I'd rather you not come into them." This did not seem a severe restriction or limitation.



teachers did not participate either because of inconvenience or unwillingness to take part in the study.

Numbers of studies have identified various sub-groups of teachers holding quite different attitudes towards the profession or towards classroom teaching. Corman for example, identified nine such groups on the basis of stance towards teaching when stance was defined as "the pattern of teachers' beliefs about the purpose of her activity, her view of children, fellow teachers and administrators and her commitment to teaching." It was not possible, Corman found, to predict teaching stance from sex, age, marital status or grade level taught. In a study of New York teachers Griffiths identified four distinct groups of teachers defined according to their attitudes towards both teaching and their employers. Numbers of other studies have been reported and in all cases there were more than three sub-groups of teachers. The teachers whose work is reported in this study are, therefore, clearly not a representative sample of any known population.<sup>3</sup>

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<sup>3</sup> Bernard R. Corman, "The Stances of Teachers Towards Teaching," Abstract in American Educational Research Association, Abstract of Papers, 50th Anniversary Meeting Chicago 1966 (Washington, D.C.: American Educational Research Association, 1966), p. 35; Daniel E. Griffiths et al., "Teacher Mobility in New York City," Educational Administration Quarterly, 1, 1965, passim.

### THE PARTICIPATING TEACHERS

The three teachers participating in the study were, as has been stated, volunteers. Each was a graduate teacher of social studies and two of the three had completed the master's degree in social studies education at the provincial university within the past four years. The third teacher was actively pursuing his second degree, a B.A. at the provincial university. The three teachers were, in addition, all experienced in all programs in social studies and all had taught in the co-operating school for some years. Before volunteering for the study they were given assurance of anonymity.<sup>4</sup>

#### TEACHER A

Teacher A had taught for the school authority which was employing him at the time of the study since 1951. Since 1952 he had been teaching in the co-operating school where he had taught both senior music and social studies. He had a B.A. and B.Ed. from the university in fine arts education and, in 1965, completed the program for the M.Ed. in social studies education. At the time of the experiment he considered himself to be a social studies teacher with a

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<sup>4</sup> Each of the teachers is identified in the study by means of an initial, A., B., and R., in referring to periods taught, the teacher's initial is used first, followed by the level of the class. Each teacher provided a summary description of his experience and training.

primary interest in history. He had completed in both his pre-teaching education and his post-graduate education six courses in history, one course in sociology, one course in social philosophy and social psychology and one course in political science.

#### TEACHER B

Teacher B was a graduate with a B.Ed. from the provincial university. He had taught for one year in another urban school system and for eight years in the co-operating school. He had completed five-sixths of the requirements for a B.A., his second degree. He identified himself with both history and geography as his teaching subjects. He had passed two courses in ancient history, four courses in geography, five courses in history, one course in political science and two courses in philosophy in both his pre-service and later course work.

#### TEACHER R

Teacher R was the assistant department head responsible for the social studies division of the vocational wing of the co-operating school. He was graduated B.A. with a major in history in 1955, B.Ed. in 1960, and M.Ed. in social studies education in 1963. He had begun his teaching career in 1956 as vice-principal of a small rural high school. In 1957 he joined the teaching staff of the city

board and from 1957 until 1962 had taught social studies and language in a junior high school. From 1963 until 1966 he had been teaching in the co-operating school. He identified himself with history, although he felt that sociology offered a better potential core than history for students enrolled in the vocational wing of the composite high school. He had completed five courses in history, one course in ancient history, one course in political economics, one course in geography, one course in educational sociology, one course in political science and one course in the history of education in both his pre-service and later studies.

#### THE PROGRAMS TAUGHT

All social studies teachers in the school nominally taught the same material. School-wide examinations were set in all courses and, in this way, pacing emphasis and content were controlled throughout the school. School programs, moreover, were prescribed by the provincial authorities. This introduces a measure of uniformity in all schools of the province, but it was noticed during the investigation that each teacher taught what was officially the same material in widely different ways. At best then, it can be said that when teachers were teaching "the same material" they were teaching the same general body of

content, but that their methods and their emphases might differ considerably.

There was, however, a general similarity of approach on the part of the teachers towards their material, except for the classes of one teacher, R., in his Sociology and his Social Studies 30 (Diploma) course. Sociology is a relatively unstructured course approved by the provincial authorities but with no provincially-set examination; rather than being a course in sociology it is a course in social problems and students were encouraged in R's classes to report on their own experiences and conjecture on right modes of behavior. R's social studies 30 Diploma group was, in one sense, an experimental class. The diploma course is a non-matriculation program not bound by the constraints of the external grade XII examination. This encouraged some flexibility in teaching, and the topics dealt with were different than those dealt with in the Social Studies 30 matriculation program. To the observer, however, there seemed not much difference in the general tone and the intention of R. in either of these two Social Studies 30 classes. There was, however, substantial difference between these two classes and his Sociology 20 class. There did not seem to be much distinction between the other two teachers in their intentions or stance towards their classes. In general terms their teaching was content-centered and

directed towards coverage of the prescribed material. Both A and B would be labelled broadly as "academic teachers"; B called Teacher R on one occasion an "affective teacher," saying that he directed his teaching towards the changing of the attitudes of his students. There was some suggestion that this was a more appropriate description of R. in his Sociology class than in his two grade XII groups.

The co-operating school adopted no streaming or ability grouping procedure of any sort. In all cases students were randomly assigned to classes. The only exception to this general randomization was the tendency for students of lower ability, or of vocational interest, to take courses such as Sociology or Social Studies 30 Diploma as comparatively easy options. R said that the sociology class was "a fair way below average"; this sociology class was made up of students from both grade XI and grade XII and, as a group, the class seemed to represent a lower socio-cultural level than all other classes observed. There was, as well, some tendency for the matriculation social studies class of R to be made up of primarily vocationally-oriented students. A and B both regarded their classes as of average quality, although B. expressed some preference for teaching the Social Studies 20, group 2 over the Social Studies 20, Group 1. He presumably found this group more teachable.<sup>4</sup>

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<sup>4</sup> Herbert A. Thelen et al., Classroom Grouping for Teachability. (New York: John Wiley & Sons, 1967), passim.

The size of, and sex distribution in the co-operating classes is set out in Table 5.

TABLE 5  
NUMBER OF STUDENTS IN OBSERVED CLASSES

CLASS GROUP			MALE	FEMALE	TOTAL
A	Social Studies	30	10	9	19
	"	20	9	10	19
	"	10	13	15	28
B	"	20 Group (1)	15	11	26
	"	20 Group (2)	11	19	30
	"	10	13	17	30
R	"	30 (Matric)	11	6	17
	"	30 (Diploma)	12	17	29
	"	Sociology 20	10	15	25
TOTAL			104	119	223

### THE RECORDING OF CLASSROOM LESSONS

It was intended in the planning of this study to tape six lessons from each of the three groups taught by each teacher, making in all a total of 54 periods. The teachers were asked to make no changes at all in their teaching and to teach exactly as they would normally. The suggested six periods of observation seemed an approximation to the average time of observation in most other interaction studies and, in addition, doubled the minimum time period of approximately two and a half hours of observation recommended by Armstrong, DeVault and Larson.<sup>5</sup>

Actual classroom observation took place during the first three weeks of March and the last two weeks of April, 1966; the Easter holidays and examinations necessitated the break in recording time. In no cases were the actual recording and observation followed for more than two consecutive periods. The school used a four-block timetable which meant that a teacher did not teach the same class in the same

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<sup>5</sup> Armstrong, DeVault and Larson report that in "results indicate that both for the Wisconsin TERP and Flanders system a time period of approximately two and a half hours of observation time is necessary, if a confidence level of .05 seems acceptable." Jenny R. Armstrong, M. Vere DeVault and Eleanor Larson, Consistency of Teacher Communication: A Sampling Problem in Interaction Analysis, abstract in American Educational Research Association, Abstracts of Paper, Chicago 1966 (Washington, D.C.: American Educational Research Association, 1966), p. 88.



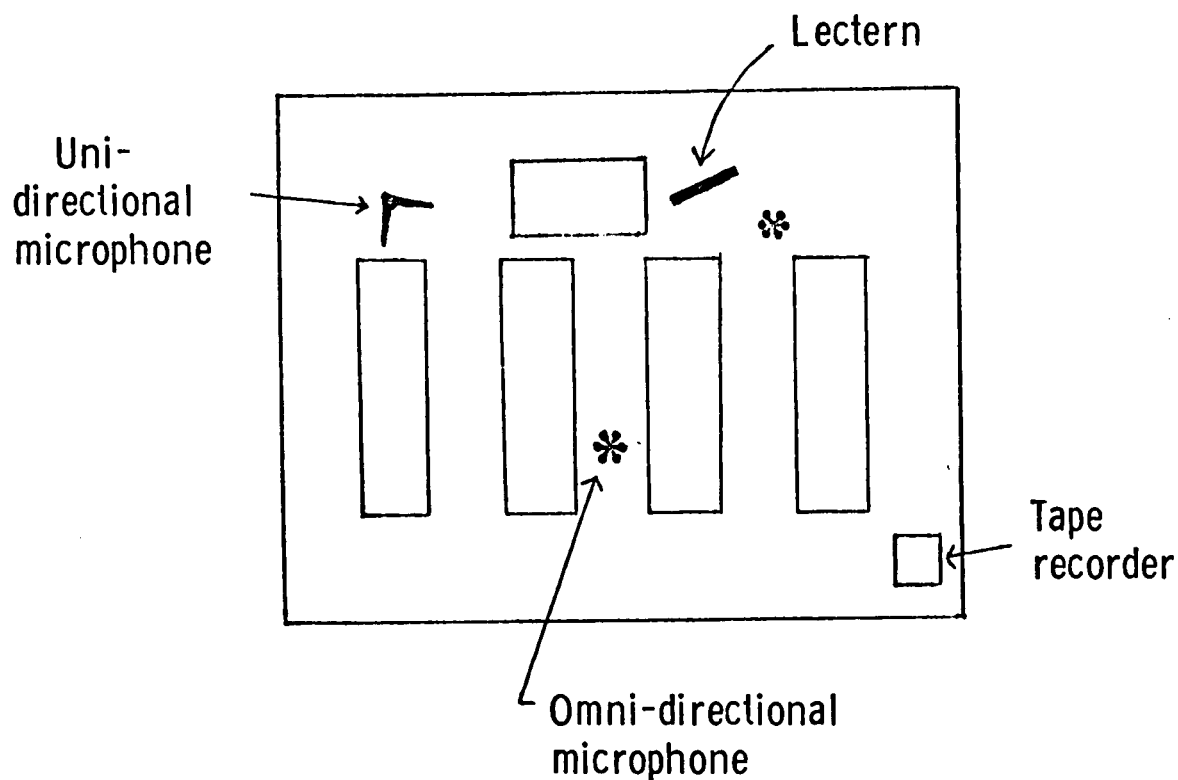
period on two consecutive days. The investigator had met all classes before the periods of observation began and had explained the purposes of the investigation.

It was intended that all periods observed should be taped. Equipment failure made this impossible and, as a result, in some cases more periods were observed than were successfully recorded. The number of periods observed and recorded are set out in Table 6. Three microphones and a large collection of wire leading to a tape recorder, mounted on a portable trolley at the back of the classroom, were used for class recordings. Tapes were recorded at 1-7/8 i.p.s. so that a complete period could be recorded on a single six-inch tape. The general arrangement of tape-recorder and microphones is set out in Figure 10.

The investigator-observer was present in all classes monitoring the taperecorder and making running notes of classroom procedure, non-verbal behavior and general organization of detail.

There is no doubt that the presence of the observer and of the equipment concerned all teachers. On a number of occasions one teacher remarked that, "the equipment did not disturb him but it was clear that it disturbed the class." Teachers tended, too, to refer to the microphones in one way or another, and on occasions attempted to draw the observer into the classroom lesson.

Fig. 10 Distribution of Microphones & Equipment in the Classroom



The lessons that were observed did seem, however, to be consistent with experience of normal lessons and it is presumed that the presence of the observer, tape recorder and microphones did not affect classroom behavior significantly. At the conclusion of the investigation all teachers remarked that, after some initial hesitation, they became used to the equipment and the students seemed to lose their hesitancy. At other times uninhibited behavior on the part of the students suggested to the observer that they had

TABLE 6  
NUMBER OF PERIODS OBSERVED AND RECORDED<sup>1</sup>

Teacher	A	B	R
Class			
SS 30	6 (5)	-	8 (6)
SS 30 (D)	-	-	8 (5)
SS 20	6 (4)	(5 (4) <sup>2</sup> (6 (3) <sup>3</sup>	-
Sociology			6 (4)
SS 10	7 (6)	6 (5)	-

1. Periods recorded bracketed
2. Group (1)
3. Group (2)

forgotten about the equipment. However, it is not necessary to assume for the purposes of this investigation that the behavior observed in the classroom was natural classroom behavior; it is enough to presume that the behavior observed in this study represented the behavior of teachers who were being observed.

### THE CODING OF TAPES

It was part of the purpose of this investigation to develop a means of recording classroom behavior without the need for making extensive and lengthy tapescripts of actual lessons. As has been suggested above, the conventions of the Flanders' instruments were the basis for the development of the analytic systems; these conventions specify a coding of speech behavior in a classroom or tapes of actual periods and use a time-grid as a basis to indicate the frequency of coding.

The Flanders' coding system implies translation of events into numerical codes so that chains of classroom group interaction become events amenable to the conventions of the system. Sequences of classroom phenomena are reported as a chain of numbers representing the categories of the coding instrument. Events are coded on a three-second time grid except when events sequences change so frequently that the three second grid would result in missed phenomena; in these circumstances events are coded as frequently as is justified by the events.

Coding of this type results in an array of numbers representing both single communications and the overall sequence of the communications. A sequence (coded according to the conventions of the Force System) 3333333333 would imply thirty seconds of teacher talk in which the teacher was

giving information or committing himself to doing something. A sequence (again coded according to the conventions of the Force System) 77777777779999999999 would imply a thirty second teacher question followed by a thirty second student reply which gave information to the teacher. Following Flanders pairs of numbers representing single communications were then bracketed in the following fashion:

7 7 7 7 7 7 7 7 7 7 9 9 9 9 9 9 9 9 9 9

The two numbers thus linked can be then used to represent the coordinates of an interaction matrix which can summarize the total communication pattern of the exchanges recorded. The interaction matrix that the summary matrix represents is isomorphic to the Markov statistical model and is, therefore, amenable to statistical analysis. The summary interaction matrix and the statistical model are described fully in Appendix B.

#### CODING PROCEDURES

All coding was completed from the tapes made by the observer-investigator of the classroom periods observed. Fifteen of the tapes were inaudible and were discarded from the investigation.

All tapes were scored initially by the observer-investigator. After reading the notes that had been collected

as the tape recorder was monitored, the tape for each period was played twice and the following data collected.

1. On the first playback a count was made of the time the teacher spent in group interaction, individual interaction and other activities. No attempt was made to secure inter-coder reliabilities on this counting.
2. A count was made of the amount of time spent in different classroom activities, classified loosely under headings such as drilling, lecturing, discussions, etc. Again no attempt was made to secure inter-coder reliabilities in this counting.
- 3 At the same time as this time counting was made and when the classroom interaction was amenable to the conventions of the system, that is, when there was group interaction, the tape was coded according to the conventions of the Procedural System. An electronic metronome was used to control the frequency of coding.
4. After this initial playback and coding each tape was re-played and coded according to the conventions of the Force System. The mentronome again controlled the frequency of coding.

All codes from the two formal interaction systems were transferred from the original coding sheets to I.B.M. cards after the completion of all coding. This processing of tapes and cards took all of May, June and most of July 1966.

Spot checks were made twice a week as the tapes were initially scored and twice during the scoring period formal reliability checks for intra-scorer consistency were made. These results were reported in Chapter 4. The tapes chosen for scoring on these occasions were randomly selected. After the initial period of scoring, a second coder was trained and scored a number of randomly selected tapes. A programming error due to misprints in Flanders' Teacher Influence, Pupil Attitudes, and Achievement<sup>6</sup> made it necessary to repeat these inter-rater checks. Two further coders were trained in January and February 1967. The results of this scoring were also reported in Chapter 4.

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<sup>6</sup> Flanders, op. cit., p. 32 should read  $z = \frac{\sqrt{2}X^2}{\sqrt{2n-1}}$

## CHAPTER VI - THE STUDY OF TEACHER BEHAVIOR

To this point this study has been primarily concerned with the conceptual development and the tentative operationalization of an approach to analyzing teacher-student interaction. The ultimate test of these categories is, of course, their use; the most significant categories are those which can be entered into meaningful relationships with other variables defined by other conceptual systems. Yet before this search for relationships can begin, the usefulness of the initial variables, their validity and their reliability must be established. This task is approached in this chapter.

It was suggested in Chapter I that the usefulness of the sets of distinctions that were foreshadowed there and developed in the later chapters of the study was to be judged in terms of a general criterion of "utility." It was suggested that ultimately this criterion must be conceptual-theoretical, but initially at least the notion must be developed in terms that are consistent with the psychometric concept of "validity," and inevitably the prior question of "reliability" - in Cronbach, Rajaratnam and Gleser's terms generalizability across some universe of persons, occasions or situations, from one observation to another - must be answered. The greater part of this chapter will explore some phenomenal and statistical problems associated with this



concept of generalizability of the behavior of the teachers observed in the course of this study.

Two basic sets of distinctions were developed in Chapter 1; the first, Jackson's "interactive-individual," "interactive-group" distinction will be dealt with initially; the second distinction, the classification of interaction-group behaviors in the terms of the two systems described in Chapter 5 will be dealt with in the concluding part of this chapter.

#### "INTERACTION-INDIVIDUAL" AND "INTERACTION-GROUP"<sup>1</sup>

Jackson, it will be recalled, uses the terms "interaction-individual" and "interaction-group" to describe two qualitatively different and distinct modes by which a teacher relates with students in a class. In the first mode, interaction-individual, when a teacher is in face to face individual contact with a student or a small group of students, the student-teacher relationship is intense, affect-laden, and intimate; the group mode is characterized by the "lesson" in which the teacher talks to the group in an impersonal, task-oriented and affect-neutral way. It was suggested in Chapter I that these gross categories might be found useful in an exploration of behavior in secondary classrooms and that these modes might serve as a useful and meaningful way of distinguishing between teachers.

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<sup>1</sup> See above p.11.

The basic data categorized in these terms was derived from the notes taken by the observer as the tape-recorder was monitored; time counts were taken from the tapes. The results of the application of these terms are set out in Table 7; the category of "other" used in this Table covers debates, student reports, student-led discussions and the like. No attempt was made to secure inter-rater reliability and the results of the analysis are presented without statistical tests.

The percentages of total time spent in each mode by the different teachers vary widely: B spent 83.3% of his teaching time in the group mode, while A gave only 46.6% of his time to this mode. A spent, moreover, 34.1% of his time in "other" activities; B spent only 1.6% of his time in "other" activities. Each teacher spent between 10% and 20% of his time in various modes of interaction with individual students, mainly when the students were doing seatwork. The categories apply, therefore to secondary classrooms. A further suggestion follows: if group, individual, and "other" activities are considered gross forms of teaching method, the implication must be that there are wide differences between the methods teachers use.

There are, however, wide differences between the classes taught by any one of the teachers in the distribution of time to each of these three broad categories. The results

TABLE 7INTERACTION MODESDISTRIBUTION OF GROSS ACTIVITIES OVER FIRST FOUR  
PERIODS OBSERVED IN DIFFERENT CLASSES - IN MINUTES

TEACHER A			
	<u>Group</u>	<u>Individual</u>	<u>Other</u>
SS 30	106	40	37
%	60.1	20.7	19.1
SS 20	90	15	95
%	45.0	7.5	47.5
SS 10	64	56	66
%	— 34.4	— 30.1	— 35.4
Total	270	111	198
%	— 46.6	— 19.1	— 34.1

TEACHER B			
	<u>Group</u>	<u>Individual</u>	<u>Other</u>
SS 20 (1)	157	7	9
%	90.7	4.0	5.2
SS 20 (2)	144	50	0
%	74.2	25.7	
SS 10	156	25	0
%	— 86.1	— 13.8	—
Total	457	82	9
%	— 83.3	— 14.9	— 1.6

Table 7 continued .....

TEACHER R			
	<u>Group</u>	<u>Individual</u>	<u>Other</u>
SS 30 M	200	0	0
%	100.0		
SS 30 D	96	48	29
%	55.4	27.7	16.7
Soc.	110	23	50
%	60.1	12.5	27.3
Total	406	71	79
	73.0	12.8	14.2

, of this analysis are also set out in Table 7. A spent 7.5% of his time in Social Studies 20 and 30.1% of his time in Social Studies 10 in the individual interaction mode. In Social Studies 30 he spent 60.1% of his time in the group mode and in Social Studies 10 he spent 34.4% of his time in this mode. Teacher B spent 90.7% of his time in Social Studies 20 (1) in the group mode and 74.2% of his time in this mode in Social Studies 20 (2). He spent 4% and 25.7% in these two classes respectively, in the individual mode.

The most noteworthy feature of this analysis was the wide variation possible in a use by a teacher of these three simple modes of interaction. The range is well illustrated in the case of Teacher R. In his Social Studies 30 (M) group 100% of time was spent in the group mode. In Social Studies 30 (D) R spent 55% of his time in the group mode and 16.7% of the time in the "other" mode; in his Sociology Class 60.1% of the time was spent in the group mode and 27.3% in the "other" mode. Similar wide variation is evident in A and even in B, the most stable of the three, there are still seemingly significant differences.

B's pattern suggests how great the problem of sampling behavior might be. The results in Table 7 were calculated over the first four periods observed in the different classes. Teacher B spent 50 minutes (23.7%) of his 194 minutes observed in Social Studies 20 (2) at seatwork; in

Social Studies 20 (1) he spent only 7 minutes during these four periods in this mode. The observer's notes indicated however that his next period with his Social Studies 20 (1) group, that is, the 5th period observed, was spent entirely in seatwork! This point and this problem of sampling will be developed at greater length in the concluding pages of this chapter.

### THE ANALYSIS OF INTERACTION BEHAVIOR

The general characteristics of the instruments that were used for this part of the study have been described at length in the previous chapters. This part of this chapter will report the results of the analysis of interaction (defined as interaction-group) that was, in fact, the major part of the empirical phase of the study.

The hypotheses posed in Chapter I for this part of the study centered on the problem of the phenomenal stability of interaction; it was hoped to get some insight into the general question of reliability of interaction instruments through phenomenal analysis of this type. This general question was posed in terms of an investigation of the consistency in interaction pattern of the three teachers whose classes were observed, between sampled periods within one class and between the three class groups observed.

The major instrument used in this part of the

investigation was the Darwin Markov test described in Appendix B. This test, which has been used in studies by Flanders and others working within his tradition offers a seemingly valid means of testing the null hypothesis that sets of transition matrices are the same. This test, and the research techniques implied in the choice of the statistical model seemed justified in the first stages of the study by the use made by Flanders and others of the test; a valid statistical test was wanted in that it seemed to offer a more rigorous means of exploring the research questions than inspection procedures. At the same time as this test was used a series of correlations between rankings of the summary rows of the transition matrices was undertaken to explore the strength of association between behavior patterns in teacher-student interaction.<sup>2</sup>

It was known before these statistics were used to test the hypotheses that were outlined in Chapter I that this approach to generalizability did not satisfy the requirements

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<sup>2</sup> Darwin's test does not provide a test of relationship. Kendall's W is used here as such a test of relationship with the summing row of the matrices derived from each instrument as the correlated sets. W is used as a descriptive statistic only with 1.00 indicating perfect correlation or consistency between the sets and 0.00 indicating no relationship. No distribution is known of the data used here and so no attempt has been made to use any test of significance associated with the Kendall statistic.

of a true "G" study. Nevertheless it was felt that this method might clear some of the phenomenal ground and thus serve as a useful first approach to more systematic and more formally psychometric investigations. In hindsight the hope of establishing a basis for generalization was not fulfilled although the investigation did throw considerable light on the nature of the problem of meaningfully generalizing the results of interaction studies. The fuller understanding of the problem that will be developed in the concluding pages of this chapter and in Chapter VII and VIII was the result of what was done at this point of the study. The results that were obtained from the application of the Darwin test and Kendall W correlation statistic will be reported here to set the stage for the later and, at this point, very tentative speculation. The hypotheses that were set out in Chapter I will be dealt with seriatim hereafter.

## RESULTS AND ANALYSIS

### 1. TEACHERS IN ONE CLASS

#### 1.1 Behavior of Teachers between Periods within One Class - Force

There are no significant differences between the different periods within a given class taught by a given teacher in the frequency distribution of the different coded force behaviors.

Table 8 shows the chi-squares and the z-scores for the matrices of the periods taught by the three teachers



TABLE 8  
DARWIN TESTS OF CODED FORCE BEHAVIORS  
FIRST FOUR PERIODS - ALL PERIODS

		$\chi^2$	df	z	p
	30	393.148	468	-2.537	>.990
A	20	501.635	468	1.097	>.100
	10	421.781	468	-1.534	>.900
	20 (1) <sup>1</sup>				
B	20 (2) <sup>1</sup>				
	10	620.057	468	4.637	<.001
	30M	535.763	468	2.156	>.010
R	30D	449.057	468	-0.609	>.500
	Soc	384.458	468	-2.848	>.995

---

<sup>1</sup> Only three periods analysed.

between the first four periods observed within each of the class groups. The results are not, as can be seen, entirely conclusive. In three cases there are grounds to accept the hypothesis set out above; however, in four other cases the hypothesis could be conclusively rejected with a significance level exceeding .100. In general terms therefore, there is no basis in these results to accept the hypothesis that there is a constancy in teacher force behavior which can be detected by these instruments and by the Darwin test.

As a further test of this experimental hypothesis a Darwin test was conducted between all periods observed and coded in the course of the study. Table 9 shows the chi-squares and z-scores resulting from this analysis. Here in all but two cases the hypothesis was rejected.

In addition to these Darwin chi-square tests, the Kendall Coefficient of Concordance, W, was calculated from the rank orderings of the entries in the summing rows of the matrices compiled to test the statistical stability of the behavior of the teachers between periods within one class. These coefficients are set out in Table 10.

No clear pattern emerges from the coefficients except perhaps the tendency for B to have a generally higher coefficient than either A or R. This is consistent with the judgement of the observer that B was more stable in his pattern of teaching behaviors than were either A or R in his

TABLE 9  
DARWIN TESTS OF CODED FORCE BEHAVIORS  
ALL PERIODS

		$\chi^2$	df	z	p
A	30	554.887	624	-1.999	< .975
	20	501.636	468	1.096	< .10
	10	855.508	780	1.880	< .25
B	20 (1) <sup>1</sup>	351.353	312	1.549	> .05
	20 (2) <sup>1</sup>	465.910	312	5.566	< .001
	10	620.057	468	4.637	< .001
R	30M	1024.780	910	2.622	> .001
	30D	592.833	624	- .879	> .10
	Soc	385.482	468	-2.812	> .995

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<sup>1</sup> Three groups only.

TABLE 10  
KENDALL W COEFFICIENTS BETWEEN SUMMING ROWS  
ACROSS FIRST FOUR PERIODS OBSERVED - FORCE

<u>Teacher</u>	<u>Group</u>	<u>W</u>
A	30	.645
	20	.844
	10	.847
B	20 (1)	.902
	20 (2) <sup>1</sup>	
	10	.838
R	30M	.921
	30D	.851
	Soc	.604

---

<sup>1</sup> Three periods only compared.

grade XII groups. The low coefficient from R's sociology group reinforces a similar judgement of the observer that in this class he ranged over a wider number of teaching behaviors than he did in his other two groups.

### 1.2 Behavior of Teachers between Periods within One Class - Programming

There are no significant differences between the different period matrices within given classes taught by a given teacher in the frequency distribution of the coded programming behaviors.

Table 11 shows the chi-squares and the z-scores for the matrices of the periods taught by the three teachers between the first four periods observed in each of the class groups. In all cases, the hypothesis set out above is rejected. There is, therefore, no basis in these results to accept the hypothesis that there is a constancy in teacher programming behavior which can be detected by these instruments and the Darwin test.

The experimental hypothesis was further tested by a Darwin analysis between all periods observed and coded in the course of the investigation. Table 12 shows the chi-squares and z-scores resulting from this analysis. The results did not differ from those of the four-period case. There is, therefore, no basis in any of the analysis undertaken to support the acceptance of the experimental hypothesis.

TABLE 11  
DARWIN TESTS OF CODED PROGRAMMING BEHAVIORS  
FIRST FOUR PERIODS - ALL PERIODS

		$\chi^2$	<u>df</u>	<u>z</u>	<u>p</u>
A	30	359.424	270	3.595	<.001
	20	369.887	270	3.982	<.001
	10	412.924	270	5.521	<.001
B	20 (1)	443.010	270	6.550	<.001
	20 (2) <sup>1</sup>	274.225	180	4.472	<.001
	10	536.154	270	9.530	<.001
R	30M	305.275	270	1.497	>.05
	30D	350.964	270	3.278	<.001
	Soc	313.173	270	1.811	>.025

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<sup>1</sup> Three periods only observed.

TABLE 12DARWIN TESTS OF CODED PROGRAMMING BEHAVIORSALL PERIODS

		$\chi^2$	df	z	p
A	30	528.752	360	5.705	<.001
	20	369.887	270	3.983	<.001
	10	690.905	450	7.190	<.001
B	20 (1)	439.344	270	6.427	<.001
	20 (2)	274.266	180	4.474	<.001
	10	674.802	360	9.923	<.001
R	30M	512.971	450	2.047	>.01
	30D	449.555	360	3.171	<.001
	Soc	313.173	270	1.811	>.025

" The Kendall Coefficients calculated from the summing rows of the programming matrices are set out in Table 13. They throw little light on the results obtained from the Darwin test although they offer the same support as do the coefficients reported above for the intuitive judgement that B had a more stable set of behaviors than did either A or R. There is, however, no support in this case for the suggestion that R's sociology group contained a wider range of teaching behaviors than did teacher R's other two groups.



**TABLE 13**  
**KENDAL W COEFFICIENTS BETWEEN SUMMING ROWS**  
**ACROSS FIRST FOUR PERIODS OBSERVED - PROGRAMMING**

<u>Teacher</u>	<u>Group</u>	<u>W</u>
A	30	.605
	20	.791
	10	.862
B	20 (1)	.923
	20 (2) <sup>1</sup>	.968
	10	.819
R	30M	.886
	30D	.769
	Soc	.882

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<sup>1</sup> Three periods only observed.

## 2. TEACHERS IN DIFFERENT CLASSES

### 2.1 Behavior of Teachers Between Observed Periods in

#### Different Classes - Force

There are no significant differences between the totalled matrices of the experimental grade-level groups taught by a given teacher in the frequency distributions of different coded force behaviors.

Table 14 shows the chi-squares and the z-scores for the matrices of the periods taught by the three teachers between all of the four-period units. The results are conclusive. In no case are there grounds to accept the hypothesis set out above. There is no basis, therefore, for accepting the hypothesis that there is a constancy in teacher force behavior which can be detected between grade groups by these instruments and by the Darwin test.

TABLE 14

#### DARWIN TESTS OF CODED FORCE BEHAVIORS

#### ALL PERIODS IN DIFFERENT CLASSES - FIRST FOUR PERIODS

	$\chi^2$	<u>df</u>	<u>z</u>	<u>p</u>
A	714.717	312	12.848	<.001
B	3227.303	312	55.381	<.001
R	923.976	312	18.028	<.001

As a further test of this experimental hypothesis, a Darwin test was made between all periods observed and coded in the course of the investigation. Table 15 shows the chi-squares and the z-scores resulting from this analysis. Again, the experimental hypothesis was rejected in all cases. There are, therefore, no grounds in either analysis undertaken to support the acceptance of the experimental hypothesis.

TABLE 15

DARWIN TESTS OF CODED FORCE BEHAVIORS

ALL PERIODS IN DIFFERENT CLASSES - ALL PERIODS OBSERVED

	$\chi^2$	df	<u>z</u>	p
A	732.483	312	13.315	< .001
B	680.257	312	11.925	< .001
R	724.125	312	13.096	< .001

2.2 Behavior of Teachers between Observed Periods in

Different Classes - Programming

There are no significant differences between the totalled matrices of the experimental grade level groups taught by a given teacher in the frequency distributions of the different coded programming behaviors.

Table 16 shows the chi-squares and the z-scores for the programming matrices compiled from the observations of the first four periods in each grade level observed. The

results are, as can be seen, again conclusive. There are no grounds to accept the hypothesis set out above that there is a constancy in teacher programming behavior which can be detected by these instruments and by the Darwin test.

TABLE 16

DARWIN TESTS OF CODED PROGRAMMING BEHAVIOR

ALL PERIODS IN DIFFERENT CLASSES - FIRST FOUR PERIODS

	$\chi^2$	df	z	p
A	465.012	180	11.549	< .001
B	452.288	180	11.129	< .001
R	552.226	180	14.286	< .001

As a further test of the experimental hypothesis a Darwin test was made between all periods observed and coded in each of the class levels studied in this investigation. Table 17 shows the chi-squares and z-scores resulting from this analysis. There is again no case in these results to accept the experimental hypothesis.

TABLE 17

DARWIN TESTS OF CODED PROGRAMMING BEHAVIORS

ALL PERIODS IN DIFFERENT CLASSES - ALL PERIODS OBSERVED

	$\chi^2$	df	z	p
A	491.977	180	11.777	< .001
B	507.264	180	12.905	< .001
R	576.629	180	15.013	< .001

### CONCLUSION

It is difficult to account simply for the rejection of all hypotheses investigated to this point in the study. In almost all cases in the basic situation explored, the Darwin test rejected the hypothesis that there was any statistical stability which could be detected by this test between the periods taught by one teacher; the Kendall coefficients which were computed for all within-class analyses in the hope that they might throw some light on this rejection offered little help in the interpretation of the results. Certainly, a great deal of data was lost in the use of the summing rows of matrices only for the computation of the Kendall coefficients and the range over which the coefficients moved was comparatively small, due in part to the probability that there would be comparatively little change in the rank orderings of the different teacher categories.

Another record was made in the data collection phase of the study which seemed to illuminate some of the problems of explanation posed by the statistical analysis reported in the previous part of this chapter. In working over notebooks and simple records of counting avenues of speculation emerged that seem to offer profitable sources for explanation of these results, and, at the same time, seemed to suggest important implications for classroom interaction research more generally.

A rough counting of teacher activities undertaken using notes collected during observation and inferences from the tapes produced the results set out in Tables 18 and 19. In the periods observed, A engaged in 64 activities that fell broadly under the heading of group interaction; B engaged in only 45 similar activities and R in 48. Teacher A engaged in 24 different activities broadly classified under the "no interaction" or individual interaction heading; B engaged in 5, and R in 6, that fell in this category.

No attempt was made to check the reliability of the counting that produced the figures reported here and no attempt was made to adjust the base of these figures. They do illustrate, however, something of the wide range of diversity that is possible across both a teacher's teaching within one class and between the total range of classes that one teacher might work with. The different activities will be reflected in different communication sequences and these different situations should, presumably, be reflected in the matrices reported above. Thus the failure to secure results consistent with the hypotheses perhaps reflects merely different sampling of methods both in the time that was spent in observation or in the classes that were observed. Teacher R might well have had only one visiting speaker during the school year. The instructions at the beginning of the study were that the teacher should in no way change

TABLE 18

SUMMARY OF TEACHING ACTIVITIES OBSERVED - ALL PERIODS

	A					B				R		
	30	20	10	20(1)	20(2)	10	30M	30D	SOC			
No. of periods observed	6	6	7	4	6	6	8	8	6			
A. No interaction or individual interaction	4	2	5	1	2	2	1	1	1			
Total	11				5			3				
%	13.1				11.9			7.0				
B. Group interaction	25	13	26	11	12	12	22	12	14			
Total	64				35			48				
%	76.2				54.7			82.8				
C. Other instructional Activities	3	3	3	1	1	-	1	1	5			
Total	9				2			7				
%	10.7				1.5			12.1				

TABLE 19  
FREQUENCIES OF TEACHING BEHAVIORS - ALL PERIODS OBSERVED

	A					B					R				
	30	20	10	20(1)	20(2)	10	30M	30D	Soc		30	20	10	30M	30D
No. of periods observed	6	6	7	4	6	6	8	8	6						
<u>A. No. interaction or individual interaction</u>															
Seatwork on assignment, silent reading, library periods	4	2	5	1	2	2	1	1	1						
<u>Total</u>		11			5			3							
<u>B. Group Interaction</u>															
1. Managing	7	8	8	4	4	6	8	5	7						
2. Lecturing, recitations, giving notes, oral reading	5	3	6	4	4	5	8	8	4						
3. Drilling, revision working through assignment	4	-	3	1	-	-	2	2	-						
4. Open and free discussions	5	-	1	2	3	-	2	1	3						
5. Testing, questioning	2	-	3	-	-	-	2	-	-						
6. Teacher rebuking disciplining	2	2	5	-	1	1	-	1	-						
	25	13	26	11	12	12	22	17	14						
<u>Total</u>		64			35			53							



TABLE 19 - continuedC. Other teaching activities

Films, film strips,  
student debates and  
reports, role play-  
ing, student led  
discussions,  
visiting speaker

3	3	3	1	1	-	1	1	5
9	2						7	

Total

Total teaching  
activities

84	42	63
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what he would normally do and R had, therefore, no reason, because of this investigation, to postpone the visiting speaker. It just happened that this coincided with the observation reported in this study. This extreme example could be multiplied across the range of methods used.

The results can be explained with less extreme examples than this one. To take only one case, A was recorded as having gone through a range of twenty-five different interaction behaviors in the periods of observation with his Social Studies 30 group. The possibility of sampling these group interaction behaviors adequately and usefully in the six periods of observation would seem to be remote; inadequate sampling might well explain the negative results reported here. The implications of this suggestion will be discussed more extensively in the concluding chapter of the study.<sup>3</sup>

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<sup>3</sup> These results are markedly different from those reported by Bellack, personal communication, whose teaching engaged in far fewer teaching "activities." It might be suggested that Bellack's instruction to his teachers that they teach one text for a post-test resulted in constrained and fundamentally unrepresentative behavior.

CHAPTER VII - QUASI-FACTOR ANALYSIS OF  
THE INTERACTION DATA

The results that were obtained from the application of the Darwin statistic and the rough counting of teacher activity strongly reinforced a feeling expressed in Chapter I of this study that an attempt should be made to investigate the higher order phenomenal clustering that might be contained within the data and which might reveal a patterning of the data into more useful categories than those suggested by the basic terms of the instruments. The results of this exploration using quasi-factor analytic techniques are reported in this chapter. This analysis seemed justified for a further reason. The choice of categories that were the bases of the two analytic systems used in the study was made on the basis of two, seemingly separate, theoretical conceptions of communication behavior. The conceptions, or the dimensions of behavior emphasized, differed - or so it seemed at first - and this difference was the justification for the choice of the two systems. In use it appeared that these differences had been over-emphasized and that there was in fact considerable overlap between the two systems. At this point (and given an initial impression of overlap) it seemed most likely that the Force system with its rationale in the

elaborate and highly developed analysis of Austin would subsume the other less sophisticated system. This possibility seemed more likely in the light of the conception that was implicit in the use of Austin's analysis in this study, that his concept of illocutionary force added a new dimension, or a redefinition of the existing dimensions, to the essentially two-dimensional conceptualization of teaching that is current. What was at stake then was the validity of the instruments and of the tentative theory on which it was based, or, to rephrase the question, the construct validity of the instrument and theory.

The reduction of the statistical space implicit in this exploration of the clustering of the interaction variables and in the analysis of construct validity was undertaken using factor analytic techniques. However, the assumptions of the factor model were not completely met in these data and the result of any analysis must, therefore, be statistically suspect. (If however the results that are obtained from any analysis meet criteria for logical or phenomenal meaningfulness the fundamental assumption of a useful analysis is met). The term "quasi-factor analysis" is used to emphasize this formal problem.

## FACTOR ANALYSIS

Factor analysis is a generic term that denotes a variety of techniques for reducing the dimensionality of a set of variables by taking advantage of the intercorrelations between the variables to express statistically the observed relationships in terms of a set of a smaller number of reference vectors or dimensions which account, in a systematic manner, for all the information contained in the larger set. It makes possible the isolation and development of hypothetical constructs which account for the phenomena and is, therefore, "a generalized method for making invisible influences visible."<sup>1</sup>

In this study the set of factor techniques seemed to offer a major advantage. They suggested a strategy for developing phenomenal clusters that reflect the dimensions of the analyses used for fundamental classification and conceptualization. Without implying the reification often suggested by the term "underlying" the idea that the variance of measures can be reduced by reference to an underlying factor

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<sup>1</sup> Raymond B. Cattell, "Factor Analysis: An Introduction to Essentials," Biometrics, XXI, 1965, p. 191. See also Benjamin Fruchter and Earl Jennings, "Factor Analysis", in Harold Borko, editor, Computer Applications in the Behavioral Sciences (Englewood Cliffs: Prentice-Hall, 1962). For an example of the use of factor analysis in the exploration of the construct validity of an interaction instrument see Harold Berlak, The Construct Validity of a Content Analysis System for the Evaluation of Critical Thinking in Political Controversy (University of California, Santa Barbara, 1964), mimeo.

structure seemed a potentially useful way of exploring, at a different level than that of the basic terms, a possible domain of higher order classificatory terms that might make phenomenal sense. At different levels of concern differing clusterings might emerge; at different tidal levels the configuration of an estuary will change and no one description is a priori preferable to any other.<sup>2</sup> Although factor analysis is not the most satisfactory technique available to ultimately producing classifications of this kind it is quite satisfactory, as a first step in such analysis, as a means of obtaining the best dimensions in which to look for taxonomic clusters.<sup>3</sup> Such a clustering might well present information and give insight about the world that the simple terms of a basic analysis do not.

As a basis for the analysis the entries in the summing row of the transition matrices obtained from both instruments were combined and Pearson product-moment correlations computed for all possible intercorrelations of the twenty three variables in the two instruments. A principal components analysis was undertaken using Householder's

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<sup>2</sup> For a recent study of this kind using interaction instruments see Donald M. Medley and Russell A. Hill, A Comparison of Two Techniques for Analysing Classroom Behaviors, unpublished paper presented to A.E.R.A. convention, Chicago, 1968.

<sup>3</sup> Raymond B. Cattell, "The Meaning and Strategic Use of Factor Analysis," in Cattell, editor, Handbook of Multivariate Experimental Psychology, op. cit., p. 180.

method<sup>4</sup> and the resulting factor matrix was rotated orthogonally to the Varimax, Equamax and Quartimax approximations to simple structure. Kaiser's recommendation that the number of common factors should be equal to the number of eigenvalues greater than one in the principal components solution was followed to determine the number of vectors to be retained for further study.<sup>5</sup>

### RESULTS OF THE QUASI-FACTOR ANALYSIS

As the first step in the interpretation of the quasi-factor solution both the principal components and rotated matrices were inspected to see if any factors were defined, solely or largely, by one or other of the two instruments. This question had to be answered before any statistical clustering could be interpreted; the answer offered the first and important evidence to support any arguments about the relations between the systems.

All factors had loadings from items in the two sets; this could be taken to suggest that either one or the other coding system could be used as the more definitive reflection of classroom communication behavior, or alternatively, that

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<sup>4</sup> J.H. Wilkinson, "Householder's Method for the Solution of the Algebraic Eigenproblem," Computer Journal, III, 1960, pp. 23-27.

<sup>5</sup> Harry H. Harman, Modern Factor Analysis (Chicago; University of Chicago Press, 1960), p. 363.

both reflect aspects of one dimension of verbal behavior.

The second interpretation would seem to be the sounder of the two and would justify the intuitive feeling reported above that the two systems coded only one real set of behaviors. The high proportion of variance accounted for by the six factors extracted for analysis would offer further support for this interpretation. Items from both instruments will, therefore, be used in the interpretation of the factors-clusters.

Means, standard deviations and the Pearson Product-Moment correlation matrix for the twenty-three category variables in the summing rows of the thirty-eight transition matrices compiled from the individual periods observed and coded are reported in Tables 20 and 21. Six eigenvalues significantly greater than one were obtained and, following Kaiser's rule, six vectors were retained for further analysis. These eigenvalues are reported in Table 22. Table 23 presents the unrotated factor matrix; and Table 24 presents the loadings on Factor 1 of the unrotated solution. Kerlinger's suggestion that the standard error of a factor loading can be approximated by the  $\underline{r}$  that is significant for the  $\underline{N}$  of the study in determining significant loadings was followed.<sup>6</sup> An  $\underline{r}$  or

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<sup>6</sup> Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart and Winston, 1965), p. 654 n.



TABLE 20  
MEANS AND STANDARD DEVIATIONS

N = 38

<u>Variable</u>	<u>Means</u>	<u>Sigma</u>
1	22.58	16.85
2	57.79	29.83
3	186.50	84.14
4	13.05	13.26
5	9.55	10.90
6	85.18	58.78
7	47.58	26.60
8	15.50	20.79
9	42.18	29.11
10	7.68	10.85
11	11.55	14.89
12	18.97	14.81
13	70.26	60.13
14	319.63	156.05
15	36.11	23.81
16	30.00	24.71
17	14.45	16.31
18	23.84	13.64
19	5.87	5.30
20	9.76	13.37
21	53.87	30.13
22	53.58	51.09
23	66.29	53.26



TABLE 22  
EIGENVALUES FOR PRINCIPAL COMPONENTS  
ANALYSIS

<u>Root Number</u>	<u>Eigenvalues</u>
1	7.159
2	3.191
3	2.498
4	1.917
5	1.685
6	1.398
7	1.004
8	0.753
9	0.628
10	0.508
11	0.465
12	0.419
13	0.339
14	0.267
15	0.260
16	0.144
17	0.131
18	0.087
19	0.052
20	0.036
21	0.033
22	0.024
23	0.004

TABLE 23

FORCE - PROCEDURAL - UNROTATED FACTOR MATRIX\*

<u>Communalities</u>	1	2	3	4	5	6
1 0.850	774	-423	-	-	-	-
2 0.823	-	-	-847	-	-	-
3 0.815	645	-	-	-	-452	-
4 0.641	456	-	-	538	-	-
5 0.743	-	-	490	-	-	-
6 0.870	546	-	-	-	-696	-
7 0.867	771	-	-	-	-456	-
8 0.710	-	-	-	637	-	-
9 0.722	807	-	-	-	-	-
10 0.721	-	703	-	-	-	-
11 0.844	-	498	-	-	-	-719
12 0.620	-	644	-	-	-	-
13 0.832	738	-	-	-	-	-
14 0.751	678	-	-	-	-	-
15 0.804	-	-	-812	-	-	-
16 0.889	742	-538	-	-	-	-
17 0.829	-	462	-	-616	-	-
18 0.784	822	-	-	-	-	-
19 0.782	696	-	-	-	-	-
20 0.451	-	-	-559	-	-	-
21 0.798	730	-	-	-463	-	-
22 0.930	454	723	-	-	-	-
23 0.771	751	-	-	-	-	-
17.847	7.159	3.191	2.498	1.917	1.685	1.398

\* Only loadings greater than  $\pm .418$  are included and decimal points have been omitted.

TABLE 24  
LOADINGS, FACTOR 1 - UNROTATED SOLUTION\*

(± .418 or greater)

<u>Item No.</u>	<u>Instrument No. and Title</u>	<u>Loading</u>
1	1. Verdictive/T	774
3	3. Informs/T	645
4	4. Conjecture/T	456
6	6. Illustrate, etc./T	546
7	7. Ask/T	771
9	9. Inform/S	807
13	13. Silence	738
14	1. Presents Information/T	678
16	3. Asks controlling question/T	742
18	5. Accepts ideas/T	822
19	6. Accepts behavior/T	696
21	8. Responds to teacher/S	730
22	9. Talks to teacher/S	454
23	10. Silence	751

\* Decimal points have been omitted.

$\pm .413$  or greater is significant at the .05 level and hence only loadings at this level and higher are reported in both the unrotated and rotated matrices.

The results of the Varimax rotation (which gave the same solution as the Equamax rotation) are reported in Table 25; the Quartimax and Equamax solutions are reported in Appendix D. The Varimax solution to the orthogonal rotation "problem" is regarded widely as preferred over the Equamax and the Quartimax; it simplifies columns rather than rows in the factor matrix and cleans up factors rather than variables. For each factor it tends to yield high loadings for a few variables with the rest of the loadings approaching zero. Loadings on the Varimax solution tend also to be less variant over a series of analyses allowing for more valid generalization of results. The tendency of the Varimax solution to destroy the general factor characteristic of the principal axes solution is well illustrated in this case.<sup>7</sup>

It was possible to interpret the first general factor of the unrotated solution as a dominant behavior factor (see Tables 23 and 24) and the other factors as subordinate behaviors; on the whole, however, this solution offered a less adequate basis for interpretation than did

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<sup>7</sup> See William W. Cooley and Paul R. Lohnes, Multivariate Procedures for the Behavioral Sciences (New York: Wiley, 1962), pp. 61-3.

TABLE 25

INTERACTION INSTRUMENTSFORCE PROCEDURAL - ROTATED FACTOR MATRIX - VARIMAX CRITERION\*

	1	2	3	4	5	6
1	0.850					
2	0.823					
3	0.815			894		
4	0.641		741			
5	0.743	685	582			
6	0.870	-452	873			
7	0.867					
8	0.710	795				
9	0.722					750
10	0.721					908
11	0.844				625	
12	0.620					
13	0.832					
14	0.751		681			
15	0.804			893		
16	0.889				892	
17	0.829					
18	0.784				502	
19	0.782	585				
20	0.451			564		
21	0.798					508
22	0.930	726				
23	0.771					
	17.847	5.651	2.490	2.403	2.383	2.186

\* Only loadings greater than  $\pm .418$  are included and decimal points have been omitted.

the rotated Varimax result. All further discussion of the factors, therefore, is based on the Varimax result.

#### INTERPRETATION OF THE FACTOR-CLUSTERS

As mentioned above, the quasi-factor analysis produced six significant factors, that is, statistical clusters. These may be interpreted as representing the following six meaningful phenomenal constructs:

1. Question-answer (or recitation) behavior;
2. Student questioning behavior;
3. Teacher lecturing behavior;
4. Teacher controlling behavior;
5. Discussion behavior;
6. Student talking behavior.

The factors were not bi-polar; only one had a negative loading and this must be understood, therefore, as a special case which will be discussed below.

The easy interpretation of the six statistical clusters justifies the application of factor analysis to the data from this study; a case can be made, therefore, for accepting these results as tentative suggestions about the phenomenal clustering of one set of interaction data because of the real-world meaningfulness of the results. These results stand as an interesting set of hypotheses about structure which must be corroborated in other, later studies.



## PHENOMENAL CLUSTER 1

The items loading on this factor are presented in Table 26. The behavior that the factor represents can be interpreted as a dynamic and sequential cluster in the following way; first, the teacher asks a question (represented by items 7 and 16); the Amidon instrument indicates that the question is a "controlling question." The teacher's question is followed by silence (items 13 and 23) before the student answers the question (items 9 and 21). The Force item indicates that the student's answer was an "inform" statement. The student's answer is followed by an affirmative or negative response (items 1 and 18) by the teacher; the higher loading given the "verdictive" of the Force instrument rather than the "Accepts ideas" of the Amidon-Hunter instrument suggests that the teacher's response was more clearly a yes/no rather than an extended - acceptance of the student's contribution. This sequence, "controlling question," "silence," "student answer," "teacher judgement" - suggests the classic question-answer method. The extremely high loading given item 16, teacher asks "controlling question," + .918, suggests the recitation or drill behavior quite strongly.<sup>8</sup>

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<sup>8</sup> The use of the term recitation "Drill" should not be taken to suggest a formal revision or drill. See Walton, op. cit., pp. 152-155, 173-176. The behavior represented would seem to be much more open, much more flexible, much freer, than the old, rather classical recitation method. At the same

TABLE 26LOADINGS - QUASI-FACTOR 1 ( $\pm$  418 OR GREATER)

VARIMAX SOLUTION\*

<u>Item No.</u>	<u>Instrument No. and Title</u>	<u>Loading</u>
1	1. Verdictive/T	807
7	7. Questions/T	870
9	9. Informs/S	709
13	13. Silence	876
16	3. Asks Controlling Question/T	918
19	5. Accepts Ideas/T	657
21	8. Response/S	705
23	10. Silence	839
Percentage of Variance extracted by Factor 1		31.66

\* Decimal points have been eliminated in this and following tables.

## PHENOMENAL CLUSTER 2

The items loading on this factor are set in Table 27. The behaviors that load on this Cluster are more difficult to link together than are those loading on Cluster 1. The cluster is bi-polar and this increases the problem

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time the question-answer behavior represented by this Factor is clearly not a Socratic or Neo-Socratic dialogue with implications of incisive questioning and drawing out of information. The conventional behavior represented by this Factor is a less pretentious, flabbier exercise.

of interpretation; however, the following interpretation of the phenomenal behavior represented seems reasonable.

A student asks a question (items 8 and 22), the teacher accepts the behavior that is implicit in the student's question (item 19) by answering; the answer is characterized by an extended personal aside represented by the Force notion of "conjecture" or "testimony," not by the Force behavior of "postulate" (item 5, loading -452) which would imply a formal systematically developed argument. The implication that could be suggested from this cluster about the world of the classroom is that the kind of questions students ask are of the type "What do you think?", not "What can be said?" and that this behavior is reinforced by the teacher's response.<sup>9</sup> The implication could be, on the one hand, that it is revelation of the teacher as a person that students seek or, on the other, that rational, systematic and impersonal discussion is far from these classrooms. There is no readily identifiable equivalent of this construct in the classical repertoires of prescribed methods.

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<sup>9</sup> The arbitrary linking of student power statements and student questions in the revised Force instrument complicates this interpretation slightly; however, the interpretation is justified if it is assumed that the "student power" category is a largely empty one, as in fact it was. "Student power" statements appeared only once or twice in the whole period of observation and the joint title, "Power and Question" was preserved in large part to draw attention to the bracketing rather than to suggest the two categories were equal partners.

TABLE 27  
LOADINGS - QUASI-FACTOR 2 ( $\pm$  418 OR GREATER)  
VARIMAX SOLUTION

<u>Item No.</u>	<u>Instrument No. and Title</u>	<u>Loading</u>
4	4. Conjecture/T	685
5	5. Postulate/T	-452
8	8. Power and Questions/S	795
19	6. Accepts Behavior/T	585
22	9. Initiates Talk/S	726
Percentage of Variance extracted by Factor II		15.32

#### PHENOMENAL CLUSTER 3

The items loading on this factor cluster are set out in Table 28. This factor is more readily interpreted than Factor 2. The items loading all represent teacher statements clustered together fairly easily under the title Teacher Lecturing and represent the teacher's formal and rational behavior. This lecturing behavior is defined fairly clearly by the Amidon-Hunter category 1, "Teacher gives information"; the definition is made more explicit, however, by the three Force behaviors represented on Factor 3, Force item 3, teacher "informs" Force item 5, teacher "postulates/argues" and Force item 6, teacher "illustrates."

These behaviors with "teacher illustrates" loading the most strongly, followed by "teacher informs" and a

positive loading of "teacher postulates" fall together easily under a construct title such as "lectures." It was a convention adopted during coding that the extended presentation of an argument should be scored as Force item 5, "teacher argues." This, combined with the lecturing aspect of a teacher's argument, does explain, perhaps, the positive loading here of Force item 5. The factor, then, is defined most clearly by the three Force categories.<sup>10</sup>

TABLE 28

LOADINGS - QUASI-FACTOR 3 ( $\pm$  418 OR GREATER)

## VARIMAX SOLUTION

<u>Item No.</u>	<u>Instrument No. and Title</u>	<u>Loading</u>
3	3. Inform/T	741
5	5. Postulates/T	582
6	6. Illustrate/T	873
14	1. Give Information/T	681
Percentage of Variance extracted by Factor 3		13.95

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<sup>10</sup> Walton writes that lectures "may be brief, informal expositions that take their beginning from classroom activity of some other kind - for example, recitation, discussion, or laboratory work - and merge again into it. Furthermore, they may be accompanied by visual aids of great variety." Ibid., p. 148. The realities of classroom lecturing are again far different from the pure form of the method texts.

## PHENOMENAL CLUSTER 4

The items loading on this factor cluster are set out in Table 29. Only three items load and they represent a small set of quite coherent behaviors. Interestingly the Force item 2 "teacher exercitive" and the Amidon-Hunter item 2 "teacher gives directions" have almost identical loadings. The same behavior is clearly represented by both items and is easily interpreted in Austin's terms as an exercitive. Item 20 (that is, Amidon item 7 - "rejects behavior") represents a disciplinary behavior that would seem to reflect the behabitive component in the Force item 2 and the "judgement," "sentencing" behavior that is implicit in both the rejection of a student's behavior or the rebuking of students. This factor clearly does not represent a method but rather a specific teacher activity (and one not shared by students in the classroom) of controlling, directing and disciplining..

TABLE 29LOADINGS - QUASI-FACTOR 4 ( $\pm$  418 OR GREATER)VARIMAX SOLUTION

<u>Item No.</u>	<u>Instrument No. and Title</u>	<u>Loading</u>
2	2. Exercitive/T	894
15	2. Give Directions/T	893
20	7. Rejects Behavior/T	564
Percentage of Variance extracted by Factor 4		13.46

## PHENOMENAL CLUSTER 5

The items loading on Factor Cluster 5 are set out in Table 30. The sequence of behaviors represented by this cluster can be described in the following way. The teacher asks a freeing question (Amidon-Hunter item 4) which is followed by a student response that does not give information or recapitulate that which is already known but, rather, expresses a point of view or explains a position. The teacher follows this up (interestingly enough) not with an approval of the student's ideas but with an acceptance of the behavior of an extended response.

The loading of items 17 (that is, Amidon-Hunter item 4 - "teacher asks freeing question") as distinct from item 16 (Amidon-Hunter item 3 - "teacher asks a closed question"), offers some verification for the initial hypotheses that led to the separation of the two separate classes of question.

The cluster represents discussion behavior with the teacher taking a leading and initiating role, but permitting the students the extended expressions of views that are implicit in the Force category of "student illustrates." As such, the cluster represents an interesting contrast with Cluster 2; it is, on the one hand, the converse of this cluster in that the teacher demands not opinion or conjecture but information from his students and, as such the cluster

illustrates the quite different roles of teacher and student in the classroom. On the other hand, the teacher's failure to follow information with judgements as to its fitness or otherwise or with more and different information hints at the same lack of formal argument and judgement in the classroom that Cluster 2 exemplified.

TABLE 30  
LOADINGS - QUASI-FACTOR 5 ( $\pm$  418 OR GREATER)

<u>VARIMAX SOLUTION</u>		
<u>Item No.</u>	<u>Instrument No. and Title</u>	<u>Loading</u>
12	12. Illustrate/S	625
17	4. Asks Freeing Question/T	892
19	6. Accepts Behavior/T	502
Percentage of Variance extracted by Factor 5		13.35

#### PHENOMENAL CLUSTER 6

The items loading on Cluster 6 are set out in Table 31. All of the behaviors represented are student behaviors defined by Amidon-Hunter item 9, "student initiated talk." The nature of the talk is more explicitly defined by Force item 10 - "student conjecture" and Force item 11 - "student postulates" which load much higher than does Amidon-Hunter item 9. The factor represents extended student presentations of personal positions and personally argued



propositions and is well illustrated in the transcript of a recorded lesson in Appendix A. Item 22 - "student initiated talk" loads both on this factor and on Factor 23, yet the associated behaviors from the Force instrument are quite different and represent, in this case, a student expression of opinion and argument, and, in the other case, student initiated questions. The factoring has resulted in precise definition of this "student initiated talk" behavior.

TABLE 31

LOADINGS - QUASI-FACTOR 6 ( $\pm$  418 OR GREATER)

VARIMAX SOLUTION

<u>Item No.</u>	<u>Instrument No. and Title</u>	<u>Loading</u>
10	10. Conjecture/S	750
11	11. Postulate/S	908
22	9. Initiates Talk/S	508
Percentage of Variance extracted by Factor 6		12.25

PHENOMENAL CLUSTERING OF THE ITEMS

It is clear that the items from the two instrument do cluster meaningfully at a higher level of analysis than the original simple counting; at this level a different interpretation of classroom events can be made than the one made on the basis of the simple and initial frequency counting. These higher levels of analysis could be used in turn

to describe teacher behavior and may, indeed, offer a more meaningful basis for comparison of teacher style than does the relatively simple description of frequency of discrete events. With more adequate statistical analysis than is usual, therefore, the relatively simple counting of the Flanders' derived systems makes possible potentially more sophisticated and complex analysis. The clusterings provide another dimension for understanding classroom behavior and offer a beginning of very specific description, and possible reproduction of methods and therefore of micro-teaching behaviors. At this level, and with an acknowledgement that at this point these results are extremely tentative, there are the beginnings of a justification of naturalistic observation of teacher behavior in that it can provide direct definition of real world variables and behaviors that must be entered into any formal description and analysis of teaching processes. At the higher level of clustering, the languages that can be developed and the behaviors that can be defined directly and rigorously may be entered into analysis and investigations of the types suggested by Gage and Travers. For real description of the classroom, the language of clusters is more useful and potentially more meaningful than is the language of elements, although these do represent the most basic terms of all analytic languages.

The results of this successful clustering do hold

a more specific implication for this study. The rough analysis reported in the concluding pages of the previous chapter suggested that there were different methods that a teacher might use which would interfere, if they were reflected in the matrices of a Darwin analysis, with any direct inference from classroom behavior of a particular teacher on a particular occasion. It was suggested, by implication at least, that similarity and difference from one occasion to another were functions of methods rather than teachers and that any simple inference from occasional behaviors to behavior over a universe of occasions was potentially suspect. The clustering reported here suggests very definitely that differences in methods do manifest themselves in interaction matrices; teacher behavior matrices have potentially a complex and lumpy cluster structure which would confound simple statistical analysis and simple interpretation. The results obtained here do not map in any way the dimensions of this problem. They merely force us to ask a question about the meaningfulness of results, or more precisely about the meaningfulness of simple quantification of what is beginning to seem to be a complex phenomenal domain. Some of the questions implicit in the development of this argument will be raised in the next chapter of the study.

### RELATIONSHIPS BETWEEN THE TWO SYSTEMS

The constructs suggested above have been developed in the light of the items loading from both instruments; in only two specific cases was explicit definition possible using items drawn exclusively from one or the other instrument. In most cases both sets of items were needed. Thus, item 22, the Amidon-Hunter category "student-initiated talk" loads on both clusters 2 and 6; specification of the nature of the "student-initiated talk" was only possible using categories from the Force instrument with the result that, in the case of Cluster 2, it was possible to interpret "student-initiated talk" as "questions" and in the case of Cluster 6 as student "conjecture" or "argument." On the other hand, it was only possible to explicitly define Force item 7 ("teacher question") in the light of the Amidon-Hunter item 3 ("teacher asks controlling question") in Cluster 1 where Amidon-Hunter item 4 ("teacher asks broad question") did not load. Both instruments were, therefore, useful and the unique categories of each would need to be incorporated into a revised single system.

At this point, therefore, and using only the evidence of the quasi-factor analysis, it is not possible to claim that the Force system offers a better basis for understanding all interpretation of the teacher-pupil communication than does the Amidon-Hunter, and presumably the

, Flanders' system. Both instruments offer something to the interpretation, although, in general terms, the Force categories offer a somewhat more complete basis for interpretation than does the Amidon-Hunter system alone.

## CHAPTER VIII - SUMMARY AND GENERAL CONCLUSIONS

### SUMMARY

This study developed out of a concern for the problem of describing a teacher's behavior in the classroom. In beginning the study and to answer the question of what dimensions, or facets of communication behavior had to be explored for description to be meaningful it seemed that what were thought of as two dimensions, mental process and programming (or procedural) represented the important components. An attempt was made to construct a simple interaction system which could record classroom mental process from tapes and which would be amenable to comparatively simple statistical analysis. In developing such a system, however, it seemed that mental process as a possible dimension for analysis had been too simply conceived and, as an alternative, an instrument was constructed based on J.L. Austin's concept of illocutionary force, a concept which summarizes the way in which a speech act is being used, for example, asking a question, giving information, announcing a verdict, and so on; in other words, the force of a speech act is that which determines how the words of a speaker ought to be interpreted. In both the use of the Force system

and as a result of a factor analysis it seemed that the dimension of force subsumed both the programming dimension and part of the mental process dimension of the original model.

The development of these systems was the major conceptual task undertaken in the study. Inasmuch as an instrument has to produce meaningful results, the task remained (after the isolation of operational category systems) of testing whether or not there was the phenomenal stability in small samples of teacher behavior to justify the ascription of a pattern of behavior that could serve as a basis for useful inference to other logically related variables. This question was approached by means of a set of simple tests of the constancy of three teachers' behavior in three of their classes over a sample of at least four and up to six periods.

It was hypothesized for this part of the study that between the classes of one teacher within one grade level and between the grades taught by one teacher there would be a detectable consistency. Tapes were collected from the three classes of each of these three teachers and were then coded according to the protocols of the two interaction instruments. The Darwin Markov test that had been developed originally to serve the Flanders' interaction analysis system was used to examine a series of hypotheses designed

to explore consistency of teaching behavior. No evidence of statistical or phenomenal consistency emerged from this analysis.

In seeking to explain this result, the tapes that were the basis of analysis and the notebooks which were kept by the investigator as he monitored a tape recorder in the back of classrooms were checked to see if there was any basis for the failure of the Darwin test to detect stability as this was defined for statistical purposes. A simple time count suggested that there were wide differences between the classroom teaching activities in which the different teachers might engage. In large part, the record of verbal interaction that was collected for analysis was determined by the different methods which the teachers were using. Stability becomes, therefore, a question both of exploring methods which a teacher might use in the classroom and exploring individual behavior differences, the idiosyncratic variations which an individual teacher might play on the general theme set by a method. This result, although limited, does throw some new light on earlier studies of classroom behavior. It certainly compounds the difficulties of designing studies of classroom behavior. Some of the problems that these conclusions suggest are discussed further below.

The greater part of the analysis in this study was



directed to these questions. Almost no attention was given to intensive analysis of either the gross characteristics of the verbal behavior of teachers and students in the classroom or to studies of the specific distributions and character of this communication as could be revealed by close analysis both of the matrices and the social context of the teacher's behavior in the classroom.

Closer examination of the matrices does reveal that many of the patterns of communication that came out of these nine classrooms reflect accurately the characteristics of classrooms as these have been described in other studies. Thus, the matrices set out in Appendix E show very similar patterns of distribution of verbal activity to those reported in the Bellack studies. In all cases the teacher dominates the verbal communication of the classroom with between two-thirds and three-quarters of the total talk. Initiating behaviors are within the purview of the teacher almost exclusively and the student's general role is limited to response to a teacher solicitation of some form or other. Students solicited responses very infrequently and in only one or two cases did their responses structure a discussion of any consequence. Indeed, more often than not, student attempts to initiate courses of verbal or explanatory action were resisted by the teacher as an obtrusion upon his intentions for the lesson. These results (and at this point,

they can only be sketched briefly) offer substantial support for conclusions already arrived at in the course of many other studies of this kind.

### INTERPRETATION OF THE QUASI-FACTOR

#### ANALYTIC RESULT

The analysis of communication undertaken on the basis of inspection of interaction matrices and the simple application of the Darwin statistic produced no satisfactory (in the sense of positive) result. The search for an explanation of these results suggested that a variable that approximated to "methods" intervened between the simple communication events in the classroom and a teacher's characteristic style. This raised the possibility that it might well be helpful to search for higher order clustering in the data that might give an expression of these "methods" and, in addition, reveal some useful summary categories that could contain or make more useful the terms derived from the original analysis of discrete communication events. The quasi-factor analysis techniques used did produce quasi-factors which, interpreted, gave six higher order phenomenal categories for describing classroom communication behavior. These factors did correspond, in the main, to recognizable "methods"; these results made the failure of the initial search at least potentially explicable and opened up the question of the meaningfulness of the concepts of reliability

usually used in interaction studies. These implications will be discussed further below.

The quasi-factor structure that emerged here differed markedly from the types of factor structures that seem to emerge, almost as a consensus, from other studies of teaching. Thus in one recent study eight factors were reported:

1. Permissiveness versus control;
2. Lethargy versus energy;
3. Agressiveness versus protectiveness;
4. Obscurity, vagueness versus clarity, expressiveness;
5. Encouragement of content related (factual) student participation versus non-encouragement of participation, emphasis on student growth;
6. Dryness versus flamboyance;
7. Encouragement of students expressive participation versus lecturing.
8. Warmth versus coldness.<sup>1</sup>

Six of these factors have been reported in previous studies. Factors 5 and 7 were claimed to be unique to the Solomon et al, study where they are regarded as of some importance.

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<sup>1</sup> Daniel Solomon, William E. Bezdek, and Larry Rosenberg, Teaching Styles and Learning (Chicago: Center for the Study of Liberal Education for Adults, 1963), p. 28. See also Daniel Solomon, "Teacher Behavior Dimensions, Course Characteristics, and Student Evaluations of Teachers," American Educational Research Journal, III, 1966, pp. 35-47.

Dimensions of relatively narrow range, referring to styles of fulfilling the more general "task" and "social emotional" functions might prove to be more clearly related to teaching effectiveness than some of the more general dimensions investigated previously. An example of these "narrow range" factors can be seen with Factors 5 and 7 here; each refers to the teacher's encouragement of student participation, but that kind of participation being encouraged is quite different in the two dimensions.<sup>2</sup>

The quasi-factors extracted here and described in Chapter VII bear no relationship to those reported in such studies as that by Solomon et al. In this study the reference for construct building and factor naming in teacher and student behavior is defined in terms of specific communication events; in the other studies the factors are described and developed from general attributes of teacher behavior as these are recognized and categorized by either students or external observers. They represent quite different and basically unrelated approaches and a contrast of these approaches highlights the differences between communication and rating studies. In rating studies, global perceptions of behavior are used, and for immediate summarization of teacher behavior over longish periods such rating represent the most direct approach to obtaining qualitative and quantitative estimations of long-term behaviors and their perceived effects. The intent of interaction study is quite different in that it wants to explore almost the mechanics

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<sup>2</sup> Solomon, Bezdek and Rosenberg, op. cit., p. 44.

and detailed structure of this communication; as yet, techniques for even short term analysis are far from fully developed, with the implication that there is no immediate relationship between constructs evolving out of the two approaches. Each approach is, however, complementary and the general patterns which emerge from the application of the two approaches to the same teachers or classes should be consistent.

#### RELIABILITY OF CODING SYSTEMS

The problem of reliability of systematic coding systems was referred to in Chapter 1 where Cronbach, Rajaratnam and Gleser's conception of the concept as generalizability of results over some specified universe of concern was set out as the problem which had to be faced in establishing that any coding systems are empirically useful. This discussion supersedes Medley and Mitzel's important review of these questions in the Handbook where serious doubt was cast on most of the still current formulations of this concept within the interaction tradition. They write there that:

A per cent of observer agreement tells almost nothing about the accuracy of the scores to be used, mainly because the per cent of agreement between observers is relevant to only a part -- and, the evidence indicates, a small part at that -- of the reliability problem. The experience with observational studies summarized in this chapter clearly bears out a fact pointed out by Barr in 1929: that errors arising from

variations in behavior from one situation or occasion to another far outweigh errors arising from failure of two observers to agree exactly in their records of the same behavior.<sup>3</sup>

Any definition of reliability which is to be consistent with standard psychometric usage and is to offer any basis for the judgement that an instrument has usefulness as a means of making dispositional or generalizable predictions to some domain about some behavior or behaviors must include measures of the consistency with which the items in this scale scored a behavior, the number of classes visited, the number of recorders and the number of situations in which each class has been seen. Any coefficient must be a function of all of these components, and will represent a general statement about the confidence that can be placed in any dispositional and generalizable prediction that might be made from any given score.

Psychometric theory and factor theory can be closely linked in the conceptualization of reliability. Reliability, in this view, is a function of the degree of consistency with which items measure the underlying factors in a test, where it is presumed that the factors reflect accurately the domain of interest of the observer and have, presumably, some

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<sup>3</sup> Medley and Mitzel, "Measuring Classroom Behavior," in Gage, Handbook, p. 316; see also pp. 309-10.

, generalisability over this domain. Medley and Mitzel use the concepts of consistency and domain of interest tellingly (and in the way compatible with Rajaratnam et al.) to suggest that the reliability of an interaction instrument which will discriminate between classes is best expressed in terms of the factors that underly the surface traits represented in simple scores and that an understanding of the factor structure of such an instrument is essential.<sup>4</sup>

Subsequent studies of classroom interaction have given little heed to these theoretical and statistical recommendations of the Medley and Mitzel chapter in the Handbook; there are no references that can be easily cited to the Cronbach, Rajaratnam and Gleser reformulation of their tradition. There have been almost no attempts to unravel the conceptual and/or factor structures of the increasing numbers of instruments being used for different analyses; no formal treatment of the reliability problem exists.

This study approached these problems only very indirectly. Yet a presentation of the concerns that lay behind part of the study can make some of these issues clear and perhaps add some further questions. Initially, reliability was thought of as inter-rater consistency (always a practical concern in coding studies) and the problem for the study was

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<sup>4</sup> Ibid.

to search for evidence of consistency in teacher behavior by means of inspection and by use of the Darwin Markov statistic. Were the study to be attempted again and in subsequent studies using these and other interaction instruments a formal approach to reliability problem would have to be a central question.

The inter-rater tests did establish that it was possible to code items consistently and with a high degree of objectivity or, more correctly, inter-subjectivity. Given this, it can be established that shifts in the patterns of interaction between periods can be established to be a function of either the tests that were used in the study or of the phenomena being studied.

It is quite possible that the rejection of the hypothesis of consistency across matrices is a result of the behavior and characteristics of the statistical test used and not the representation of any phenomenal reality. The Darwin test has not been widely used and there has been nothing reported about its characteristics; the possibility must be entertained that it was the test, not the teachers, who caused the results obtained here. However, if this possibility is rejected (and the inspection tests give some grounds for this belief) the failure to demonstrate any consistency in behavior must be explained in other, phenomenal terms. An attempt was made to look for explanation in the



terms of such a concept as repertoire of behavior, or in Bellack's phrasing, repertoire of games. It was argued tentatively in Chapter 6 that, if a teacher has a repertoire of teaching games at his command and if the differences in the games were detected by an analysis system, no statistical test, or indeed any test by inspection, would have any hope of detecting stability in behavior unless there was either an experimental equality in the "games" sampled between the units or teachers compared, or the sampling of behavior produced such an equality in fact. This implies that an observer must either specify in advance the "games" or behavior that he wishes to observe or obtain a sample of behavior which reflects a large enough proportion of a teacher's repertoire that there will be a random distribution of behaviors in the time analysed.

"Games" were interpreted as methods in the simple counting of things that the teachers were doing that was undertaken in an attempt to secure some understanding of the failure of the statistical test to offer justification for any of the experimental hypotheses. It did seem to be a reasonable conclusion that methods or, more precisely, teaching activities were higher order phenomena which would intervene both conceptually and in reality between a teacher and the specific moves that he undertook in the classroom. Prima facie at least it seems to be a reasonable speculation

that teaching activity and interest would account for a considerable amount of the variance in an analysis of factors accounting for variation in coded behaviors.

The quasi-factor analysis was undertaken in the hope that it would tighten up these suspicions by confirming that this argument was at least reasonable in that it was a way of interpreting the actual coded data. It was known in attempting the analysis that the statistical assumptions of the analysis were being broken and that the sample was both too small and too uncertain in its properties to offer totally valid results. Nevertheless it seemed to be a potentially useful way of suggesting hypotheses for further studies.

This analysis avoided the question of the status of the quasi-factors that might be produced by asserting that the factor clusters would be surface traits, that is, phenomenal clusters rather than strictly hypothetical constructs. The search was for phenomena in the world; the argument was (and the results suggest that it is one worth pursuing) that differences in teaching activities will be reflected in clusterings of the loadings of items in the summaries of the codings; given this, reliability in the formal sense will become the more elusive with the possible implication that uncontrolled comparison of teacher behavior might become extremely difficult to achieve inasmuch

as teachers differ markedly in their repertoire of possible and actual teaching activities.

This conclusion is not particularly productive, however. If teacher observation is to be useful as a method and a technique for the study of teaching it must be assumed that a consistency of style exists, and that instruments can detect and measure the stability reliably. The factor structure of the instruments used for these observations will be complex and extraordinarily lumpy. Nevertheless, a test of measurement reliability must be developed which makes an assumption of, and accounts for, this complex underlying structure. Without such a set of procedures it is difficult to see how defensible studies of teacher behavior and style in situ are possible.

In this sense, then, the findings of this study are disconcerting. However, they do not necessarily affect the conclusions of other studies and most certainly do not imply a halting of studies of teaching until all questions asked are solved. To some extent too, these questions are not relevant in considerations of many other studies.

Thus, to cite one example of difference between this and other studies, it seems that the factor structure of the two instruments used here differed quite significantly from that reported from other instruments. It has already been suggested that this reflects the difference in focus of the different types of instruments. In this case the instruments

measured the something that is close to the phenomena of behavior; in other cases the instruments have measured categories that our vocabulary has to describe differences in behavior.

Furthermore, as has been already suggested, these conclusions do not affect all studies using instruments such as those used here. In many cases the concern of studies has been with the identification of the components of teaching, the mapping of the behaviors and moves that the generalized teacher might or does perform. The Language of the Classroom reflects this interest and here the sampling validity and reliability of the instruments do not pose serious concerns. Bellack's problem was to obtain sufficiently representative behaviors to make feasible the taxonomic judgment that a given behavior is a type. His problem is to generalize his behaviors over a sample of teaching rather than to make a claim that a single teacher does anything.

There is, however, another claim implicit in some other studies which is, perhaps, more certainly in question. Without an implication that a given instrument is measuring a truly dispositional characteristic of a given teacher it would be meaningless to make such a claim that

A study indicated a relationship between the conceptual organization of teachers and their interactions with children. The conceptually more abstract teachers helped children define and advance problems in nearly one fourth of their communications to children. The conceptually more

concrete teachers did not once help children further their problems. In addition, the more abstract teachers were more integrative in their contacts with children.<sup>5</sup>

Here, for example, it is presumed that the behaviors sampled can be generalized to become the bases for testable relationships between variables. Without such a presumption the very act of searching for correlation or explanatory relationships would be absurd. It is this claim and this process which properly lies behind Medley and Mitzel's and Cronbach, Rajaratnam and Gleser's concern with the reliability of an instrument and the implications of this for the generalization from an instrument to a behavior; without concern for this problem, and concern has been echoed very infrequently in empirical studies of teaching, attempts will not be made to establish the appropriateness and meaningfulness of the results obtained from analysis.

#### REDEFINITION OF THE GINTHER MODEL

Ginther's Three Dimensional Model of Instruction controlled most of the search for dimensions and categories for analysis in the initial phase of the study. Some of the hopes for the hypothetical dimensions suggested by the model were not fulfilled and it is important at this point to attempt to assess what the model offered to the study and what

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<sup>5</sup> Joyce, Lamb and Sibol, op. cit., p. 219.

suggestions for redefinition have emerged from this attempted application.

It was suggested in Chapter I that the Ginther model represents one of the very few attempts in educational research to construct a paradigm which represents something more than a tool for summary description of observed phenomena; it is rather the beginnings of what may be termed formal theory development. This is not to argue that the model is theoretical in the full sense of the word, but rather that it is theory-directed and represents the beginnings of a process theory-building.<sup>6</sup> Using the basic dimensions of the model, Ginther and his co-workers have constructed pure types of teaching situations which can be replicated and used in experimental investigations. The possibilities for use in this way have been by no means exhausted and justify a concern with it.

The model can, however, be criticized for the lack of clear specification, clarity, and theoretical undergirding in its basic dimensions. It seems that one of the outcomes of this investigation has been the beginnings of a possible recasting of the programming dimension of the model; and further, there is a possibility that Austin's distinctions

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<sup>6</sup> See Michael Scriven, "Definitions, Explanations and Theories," in Herbert Feigl, Michael Scriven and Grover Maxwell, editors, Minnesota Studies in the Philosophy of Science, 11, Concepts, Theories and the Mind-Body Problem (Minneapolis: University of Minnesota Press, 1958), p. 177.

, between locutionary and illocutionary acts may represent the beginnings of an even more complete reconceptualization of the basic terms of Ginther's model, but one which does not destroy what may be termed the essential meaning of his language. However, this full task was not attempted here and the most that can be claimed is that this study has explored one dimension.

Ginther's dimension of programming represented a bi-polar conceptualization of the stance adopted by the teacher in the question-answer sequence. The use of the Amidon-Hunter instrument and the Force instrument and the results of the factor analysis suggest that it is possible to think of this basic dimension in terms of illocutionary force. In other words, the most basic element of the horizontal dimension of the model is possibly illocutionary force. Ginther gave his dimension further definition and direction in terms of the freedom, or lack of freedom that was implicit in the question-and-answer sequence or, in other words, in terms of the amount of freedom which the teacher allowed his student in the interaction exchange. This study did not explore this question; however the quasi-factor analysis did suggest a set of constructs which might be used to define some of the characteristics of the freedom that Ginther suggests and which might, with further analysis, be spread out along such a dimension. It is possible to conceive of the question-answer cluster,

, the teacher-lecturing cluster, and the teacher-controlling cluster being used to define on the one hand the errorless pole of the programming dimension and the student-questioning cluster, the discussion cluster, and the student-talk cluster, being used to define the dialectical pole. The factors offer possible terms for more adequately conceptualizing the nature of the poles than do the programming analogues which Ginther used. If this conceptualization were adequate it would then be possible to derive teaching procedures from these poles of the model as Ginther has already done and use the methods so derived with powerful effect. This speculation at this point represents, however, only a suggestion for further research.

### SOME INITIAL GENERALIZATIONS

#### Classroom Talk

These characteristic patterns of verbal behavior in the classroom differ markedly from the patterns reported by Soskin and John in the analysis of the behavior of Roz and Jock, a married couple whose "normal" communication was monitored and studied. One-third of Jock's utterances were classified as structones (or information-giving statements reporting facts, identifying, classifying, analysing, explaining, etc.) and a quarter of Roz's statements were classified as structones.<sup>7</sup> In the classrooms examined in

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<sup>7</sup> Soskin and John. op. cit., passim.



this study over 40% of the statements were information-giving, that is Force categories 2, 5 and 6. This suggests something of the difference between a teacher's formal didactic classroom role and what may be assumed to be the normal role of a person interacting with intimates, and might give some insight into the difficulties of the role-learning that is such an omnipresent part of teacher education and the first years of classroom experience. It contrasts too, when viewed from the point of view of a student, with what may be conceived of as a normal adolescent's role.

#### The Classroom Actors

Perhaps the most striking feature of classroom interaction was the differing roles which students might take in response to a teacher's questioning or lecturing. One classroom observer has suggested that pupils may appear in either of two roles, either as a group of passive audience members of the classroom, or as individual targets who interact directly with the teacher.<sup>8</sup> In the classrooms observed in the course of this investigation there was a clear difference between the audience members of the class and the target members of the class. Targets tended often to seek interaction

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<sup>8</sup> Biddle, Review of Related Literature.

with the teacher, to answer questions voluntarily, even to seek the attention of the teacher. The average class seemed to have five or six target-seeking members while the remainder of the class were happy members of the audience. They watched, passively, both the teacher and the targets. When called upon to answer directly by the teacher the answer would be short and to the point, if indeed they answered at all.

Sometimes a teacher would attempt, for a short time, to involve members of his classroom audience in interaction; perhaps this was the result of the stimulus to teach well offered by the observer sitting in the back of the classroom. More often than not, however, the teacher gave up this attempt after a few minutes and what may be called the "natural" social pattern of the classroom reasserted itself. In this situation the teacher would both reinforce and seek out his active targets. Sometimes, he would call upon different targets when he knew, or expected, different responses. Thus, if a teacher were to want talk for the sake almost of talk he would choose one or two pupils who could be relied upon to talk. If he wanted opinions he would call upon one or two whom he knew would have and would volunteer opinions, no matter how worthwhile the opinions might be. If he wanted assurances that the right answer or the right opinion would be given he would select yet other students.

At times a structuring of this sort was clear and members of the classroom might fall into four fairly distinct and clear categories of respondents: the opinion givers, the answer givers, the right-answer givers and the always passive audience. More often, there was less clarity in these assumed roles and given students would appear to have perhaps as many as two or three assumed and characteristic roles. The sanctions which a class could exercise on a teacher (particularly a teacher with an observer sitting in the back of the classroom) were punitive; teaching might stop when the canons of classroom social structure were broken by the teacher whatever reason he might have.<sup>9</sup> Yet little of this seemed to emerge in the use of the interaction instrument. As Biddle points out, the externally imposed structure that is implicit in the interaction model used in this and other studies, allowed little leeway for this ever-present characteristic of the classroom to emerge. As he remarks, "we have only begun to scratch the surface of classroom variables."<sup>10</sup>

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<sup>9</sup> See Smith and Geoffrey, op. cit.

<sup>10</sup> Biddle, Review, p. 25.

### The Usefulness of Interaction Analysis

In his concluding chapter on the A.S.C.D.-Centre for the Study of Instruction, volume, The Way Teaching Is Stephen Corey asked whether the concern of interaction studies with teaching in situ, with the way teaching is and that defined fairly narrowly, necessarily reflects the concern that educational research must (of its nature) have with the improvement of instruction.<sup>11</sup> Bellack, whom Corey would seem to take to task, at least by implication, has shared this same concern; he wrote in his first drafts of The Language of the Classroom that his intention was to

describe the linguistic behavior of teachers and pupils in selected high school social studies classrooms. A subsidiary aim . . . was to study the relationships of linguistic variables of classroom discourse to pupil learning and attitude change.<sup>12</sup>

By implication, Bellack would argue, we are concerned with the effectiveness of the behaviors that are being described and analysed in producing the outcomes that we seek; but (and the rider is crucial) as a first and tentative phase of this study, an attempt must be made to produce

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<sup>11</sup> Stephen M. Corey, "The Long Run," The Way Teaching Is, pp. 77-79.

<sup>12</sup> Arno Bellack and Joel R. Davitz. The Language of the Classroom, Part II. U.S. Office of Education. Co-operative Research Project No. 1497, Institute of Psychological Research, Teachers College, Columbia University. New York: 1965, mimeo, p. 1.

theoretically meaningful and useful classification systems which can be used in process studies and evaluation.

Inevitably, perhaps, the slight differences between these two positions could be argued endlessly. Classification must be theoretically or practically relevant to be useful. It is important to justify both the area which is being ordered by means of classification as well as the classification. The problems implicit in this justification are bedevilling and justify concern with the categories and the terms that have been used. It is necessary, therefore, to offer some justification here for the enterprise which this study purports to represent.

Indeed, remarks by two students of classroom interaction make this justification more pressing. Jackson, on the one hand, has thrown some well argued doubt in The Way Teaching Is on the very wisdom and potential payoff of the present general and almost exclusive concern with the verbal component of group interaction and instructional component of a teacher's role.<sup>13</sup> Perhaps, he has suggested, the verbal talk is not the prime consideration in an exploration of a teacher's role. Thelen's remark (on the other

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<sup>13</sup> P. Jackson, "The Way Teaching Is," passim. See also Philip W. Jackson, "The Conceptualization of Teaching," Psychology in the Schools, 1, 1964, pp. 232-243.

hand), that "Really, when judged by what we know can be achieved, all schools are poor schools, and all schools can and should be improved"<sup>14</sup> would question the value or utility in the exercise of sitting in normal classrooms and analysing, at length, the fruits of the interchange between a student and teacher.

It is possible, however, to point to several real and interesting outcomes of the interaction process study of the type reported here. One such outcome is quite tantalizing in its logical implications for experimental studies of teaching and methods.

Very often, and in almost all classrooms it seems, teachers make a significant number of statements which would be labelled by an observer as "false." In the long run, this is of little consequence as other teachers or other media will probably repair any damage that might be seen to occur, and if these other media do not correct the students then the information that the teacher gave incorrectly probably does not matter. (Although to an observer statements that are incorrect can be extraordinarily irritating).<sup>15</sup>

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<sup>14</sup> H. Thelen, "The Educative Classroom," in Wardhaugh and Ivany, op. cit., p. 37.

<sup>15</sup> See C.A. Anderson and S. Hunka, "Teacher Evaluation: Some Problems and a Proposal," Harvard Educational Review, XXXIII, 1963.

Philosophically, too, there is no absolute criterion of truth or falsity, as all talk must be first of all contextually appropriate, and truth is only contextually absolute. However, in the testing situation, there is no other standard except one of an "absolute" truth - and this is particularly so with a conventional multiple choice instrument.<sup>16</sup> This can be so because the context of a test is different, perhaps more rigorous than the context of talk but the possibility leads to an examination of the whole logical nature and meaning of the measurement of the dependent variables that is characteristic of the classical methods design. A test is, by implication, different to a teaching situation, and what may be appropriate or meaningful in one context is not necessarily appropriate or meaningful in another context.

But this is a small point and would not justify the whole enterprise of interaction study. It is easier to develop a justification in terms of the possibility of developing criteria which might be used for objective measurement of particular components - in this case the interaction component - of the generalized activity of teaching.

It is commonly argued that the only valid

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<sup>16</sup> This observation is Arno Bellack's.

criterion against which teaching can be measured is pupil learning. Despite the persistent failures and weaknesses of a research tradition couched within these premises, the search continues, although it could be powerfully argued that for many purposes futility could be easily predicted. It might well be suggested that the concept of an interaction instrument and, implicitly an understanding of teacher behavior, might have within it a means for establishing criteria for certain forms of measurement and analysis. The one aspect of the suggestion was raised in the discussion above of the Ginther model. In this sense, then, the search for concepts and instruments for interaction analysis becomes an important and easily defensible activity. In the same breath it can be suggested that reliable instruments for categorizing teacher or student interaction should provide measures that are far more absolute than traditional descriptions of teacher behavior.<sup>17</sup>

This point can, however, be made and conceded without coming to any full and operational understanding of the difficult concept of teaching. Jackson's simple categories of "preactive" the phase in which the teacher plans

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<sup>17</sup> This hinted at in Jackson's "The Conceptualization of Teaching," p. 239. See also Edwin Hirschi and Milton O. Meux, A Comparison of a Discovery Teaching Strategy and a Traditional Discussion Strategy, unpublished paper presented to A.E.R.A., New York: Feb. 1967.



his activities and "interactive" which have a real power of liberation from traditional notions of teaching illustrate very clearly how much basic slicing of the concept "teaching" is needed. "Perhaps it is during seatwork and homework sessions and other forms of solitary study that the major forms of any learning are laid down. The teacher's chief contribution to this outcome may be that of choosing the solitary activity that he thinks will do the most good and then seeing to it that students remain involved." It is possible, Jackson speculates, that "the teacher might perform this vital function by doing nothing more than wandering around a room while the students are involved in seatwork."<sup>18</sup> There is here, perhaps, the basis for an entire reconceptualization of the bases of curriculum construction, the product in the first place and as Jackson points out, of the study of the way teaching is, not of the way it ought to be.

At this point, however, much of this discussion must be speculative. The task remains of establishing that some of the parameters and the terms of the study of teaching have yet to be clearly laid down. It can be suggested by arguments of this type that the enterprise is worth beginning while leaving the question "Do we have the terms?", unanswered. How important are the links that a teacher establishes with his class by means of eye movement and facial

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<sup>18</sup> Jackson, "The Way Teaching Is," pp. 24-5.

movement when lecturing to the group? It seemed to the observer in the course of this study that a teacher's eye wandered or stayed fixed on some corner in the back distance. His approach was impersonal and directed to no individual, and this was the way it was received by students. At other times, even though talking, a teacher might fix on individuals and establish an eye, and with this a personal contact with the individuals in the class. These different behaviors seemed to have different meanings and different implications for the social structure and roles of the classroom. Again, what sort of role does a teacher bring to the classroom and what are the implications of these roles for the presentation of a teacher-self to a class? Once, in one of the classes observed, and as a result of a conflict with the school administration, one teacher seemed to drop his teacher role and ask the class, by implication, what did these formal roles and relationships mean. The tone of the class changed and the teacher did not "teach" but talked and allowed his students to talk to him. (Before a lesson began and during seat work, all of the teachers would allow the same role release to occur). The teacher distanced himself from his subject, and the school, indeed the subject, and said, by implication, that it did not matter.<sup>19</sup>

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<sup>19</sup> See Erving Goffman, Asylums, Essays on the Social Situation of Mental Patients and Other Inmates (Garden City, N.Y.: Doubleday and Co. 1961), p. 94.

In this situation, the real man and not the "teacher" might come through and the real man might undermine the overt intentions of his lesson and teacher role. He might say, by implication at least, that the tasks he had set were inconsequential and in some way removed from a personal reality. Another teacher might never present this self to his classes. What the implications of these differences are and how useful the classifications they hold might be, is an open question.

These concerns, however, are outside the articulated and implicit intentions of this particular study. These are suggestions about the complex reality which might lie behind the environment of talk that surrounds, and is controlled by the teacher and student in the classroom. Speculation of this type is, moreover, quite premature. If it is important that we begin to understand just this aspect of the classroom it should be clear that substantial progress needs to be made before it can be claimed with any confidence that we have any control over the language variables that have been chosen for study. Until there is some understanding of the nature of these elements of the universe of possible variables it is difficult to be optimistic about what might be achieved. The only test of usefulness is the possibility of entering variables into meaningful relationships with other variables; but this task cannot be accomplished until the variables we have are known and understood. This is the question that this

study has raised but not answered; to ask now for answers, and for meaningful and possibly practical results, is hazardous to the development of a research idea and perhaps foolish in its implications.

#### FOR FURTHER RESEARCH

Some suggestions for further work in the area that was the concern of this study have been implicit in much of the above discussion. The following ideas might imply some priorities for any undertaking of this sort:

1. Little attention has been given to date to the behavior under practical conditions, of the statistic that was used here. Without some attention to this much of the research conducted using it must be somewhat in the dark.
2. Reliability and the attendant and implicit problems of underlying structure are similarly grey areas. Without a more complete understanding of the nature of reliability and its meaning in the context of interaction studies much of the work done to date and promised for the future is similarly uncertain in foundations.
3. A critical need exists for both extension of the application of existing systems to all grade levels and populations and for examination of the relationships between the many existing interaction classification systems. As has been suggested above, this task seems

crucial for all further development in the elaboration of languages for describing teaching and for the development of a theory of instruction.

4. New statistical models and existing but as yet unused models, need to be applied to the daunting theoretical and practical problems of the field.
5. Conceptualization of theoretical relationships that might be promising in empirical application needs to be attended to, both hand in hand with the elaboration and use of existing models and preceding the development of new descriptive models. This area is beset with the lack of theory and answers in the related disciplines which concern themselves with social relationships; but already there are some models and suggestions which might be used profitably and alongside the development of an educational research attempt to understand the role and nature of the teacher's relationship to his class and his subject. The possibility of such an interaction suggests an exciting prospect.

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## APPENDICES

- A. A Discussion of One Period
- B. The Statistical Comparison of Classroom Observations
- C. The Categories of the Bellack Classification of "The Language of the Classroom."
- D. Totalled Matrices - Procedural and Force
- E. Interaction Analyses - Rotated Factor Matrices
- F. Totalled Period Matrices - Force - 19 Categories

APPENDIX A - A DISCUSSION OF ONE PERIOD

R SS 30(M) Period 3.

Part I - Transcript of Lesson.

Part II - Transition Matrices - R SS 30(M) Period 3.

Tables

A - 1 - Phase I

A - 2 - Phase I - Adjusted Matrix Base 1,000

A - 3 - Phase II

A - 4 - Phase II - Adjusted Matrix Base 1,000

A - 5 - Phase III

A - 6 - Phase III - Adjusted Matrix Base 1,000

Part III - Discussion

Tables

A - 7 - Summing Rows - Adjusted to Base 1,000

By Factors

A - 8 - Transitions in Row 9 - Adjusted to Base 1,000

A - 9 - Transitions in Row 9

Figure

A - 1 - Summary of Phases - Adjusted to Base 1,000

By Factors.

Part I - Transcript of Period

R SS 30 (M) - p.3

R SS 30 (M)Period 3Reel XV

S. Are we to do the test first?

T. No.

S. Oh.

\* \* \* \* \*

T. What's the matter with Mary Anne?

\* \* \* \* \*

Part I

T. We are going to compare the American and Canadian Constitutions. What is one of the biggest difference between these two constitutions?  
--Yes?

S. The American constitution is written and the Canadian constitution is partly written, partly unwritten.

T. Alright. What part of the Canadian constitution is unwritten? Mark?

S. The common law.

T. The common law. Alright. - Can you be specific as far as the way our government operates as to what part here is not really written down?

S. (Inaudible)

T. Pardon?

S. Was it that right after they established the constitution they stated that (inaudible) . . . . .

T. I don't think you've got that quite right. They stated specifically both what the federal and provincial government power would be and then they said whatever powers were left over would belong to which government?

S's. Central. Provincial.

T. Which!

S. There are only three governments.

T. Yes, so you've got one chance in three.  
(laughter)

- S. Well, I said "provincial".
- T. And you're wrong.
- S. What's the answer?
- T. Federal. Federal government has the residual power in Canada. There's lots of comparisons. Alright, we've got a constitution which is written versus a constitution that is partially written here. Now there's one part of it that I think you should know which is unwritten. Just let's get this. One part of it...yes?
- S. We go by the precedent of the British Constitution going back to 1905. Also the customs going right back.
- T. Yes this is true. There is this whole tradition of customs and so on but there is one constant if you like, about government that has been developed in Britain that really wasn't written down in the B.N.A. Act...Well, alright then. Let's take a look at the difference and you remind me if I forget. We have that one difference between the constitutions. You have come across another difference this business of residual power. The federal government has the residual power in Canada. Who has it in the United States?
- S. The states.
- T. Right. The states. Residual power- - that-power-which-is-left-over-and-which-is-stated-belongs-to-the-states.
- S. Well, what about that case in Alabama with Wallace? Well, how come he stood up! I mean if the federal government has so much power how could he go along for so long?
- T. I'm saying that in the States the states have residual power.
- S. Well that's just what I'm saying. But the federal are supposed to be more powerful than the states. The federal courts \_\_\_\_\_
- T. The federal government has through the interpretation of the courts developed considerably more power than the doctrine of the States' Rights and residual power going to the states would suggest. But this is a development. The point is that constitutionally our federal government is big, tough, strong and constitutionally their states governments are big, tough, strong with lots of authority.
- T. But this has not happened and we'll take a look at this in a minute. What other comparisons can you make between the two?.....  
We've got two now.

S. Sovereignty.

T. I beg your pardon?

S. Like between our .....

T. Our constitution and our--excuse me--our way of governing and the American way of governing.

S. We have a sovereign type of..you know..like we are... recognize the Queen.

T. Right.

S. And the Americans are....

T. The Americans have a republican. So it's a constitutional monarchy on one side; republican on the other. O.K. What other comparisons could you make? Gordon, do you know?

S. No.

T. Gary?

S. The elections. In Canada...

T. Right. Good point. What's the difference between elections in the two systems?

S. One's electoral college in the United States for the president and congress and he has a four year term. The prime minister here, his government has to be voted in.

T. His party has got to be voted in. That's right. So you've got more than one point here probably in your comparison. You've got this business of elections every four years. Is this all the story in the United States? Or do you have elections even more?

S. You have elections more often.

T. I beg your pardon?

S. You have elections more often.

T. Every how often?

S. Every two years.

T. Every two years.

S. For the Senate.

T. Yes, for one third of the senate? And for all of the \_\_\_\_?

S. House of Representatives.

- T. Yes, that's right. For all of the House of Representatives. Alright--Now. So you have the elections. Once your choice of leaders. I think there is another comparison here and you were getting at this. Your president elected by?
- S. Electoral college.
- T. Electoral college! But this is kind of a formality in the United States isn't it?
- S. Because of communications in the early part when the United States was formed and representatives were sent in from every State to form a college then they were requested to elect the President.
- T. Right. It is a formality to-day because once everybody has put their X on the ballot in the United States you get results right off the bat as to who is going to be president. Don't you? Once election day is over in the United States you get results right away. So they obviously haven't waited for the electoral college to meet and then decide who is going to be president. Do you understand this, Linda?
- S. No.
- T. How is the president chosen in the United States?
- S. Well, I know that the parties choose the leader.
- T. Yes. Last election. Let's get it. Goldwater versus Johnson. Yes. Republican. Democrat. Alright, then what?
- S. They have an election.
- T. Then they have an election and you decide who you want.. yea. The only thing is in between there you've got the electoral college which isn't too significant. You could almost say the president was elected by popular vote. Not quite though, not quite. Yes?
- S. Do they vote for the president, the candidate directly, or for the electoral college?
- T. They are voting for a person who is going to be in the electoral college.
- S. And he votes for him?
- T. Yes! Yes! Well it's automatic who he will vote for except in a few cases in the South that occurred in the last election. Yes?



- S. Well, judging by past history one is bound to be a Democrat or a Republican. Well say some person some sort of independent ran and was elected president and then went Democrat in the House and Republican in the other. What would happen? How would they work it out?
- T. Well, you have just come across another contrast here because, who is the executive in the American system? Jim. What is the executive? Who is the executive in the American system?
- S. (Inaudible)
- T. Jim.
- S. (Inaudible)
- T. Yeah. Who is the executive? Do you know what executive is? What is it?
- S. The main power of government.
- T. Main power of government. Well what does the executive do; what is its function?
- S. (Inaudible)
- T. Beg your pardon?
- S. They pass bills.
- T. They pass bills! They don't pass bills...yes, Jim.
- S. The president he picks his cabinet from whoever he wants in the country.
- T. Yes.
- S. And prime minister picks his cabinet from amongst his own party.
- T. (writing on chalkboard). O.K. The cabinet is picked by the prime minister from party members. Where? -- the members of parliament. O.K. The president picks his cabinet from outside Congress. The whole point here is, you people. we have...George you brought up this whole point here you've got a Congress that is Republican or Democrat and you've got a president you said might be independent. This is possible. Is it possible to have a president who is Democrat and a Congress which is Republican?
- S. Yes, it's possible.

- T. (at chalk board) Yes. You do understand that, Gordon? The reason is that the president is elected on a different ballot. People in the United States, within each state, say, will elect Republican or Democrat electors for the electoral college. If we elect Democrat electors, then they will go and choose Johnson. And then they say we are also going to elect senators and congressmen, or House of Representatives men. O.K.--Now, the situation here is different. The people elect members from constituencies. The person who becomes prime minister, where does he come from? Another constituency. You see. He is just an ordinary constituency man. This man is voted into power by the whole country. So that a prime minister gets his job, as somebody was saying, by being the leader of the winning party. You see, this leader of the winning party--he chooses his cabinet--Now, then this whole business of responsible government comes into the picture..O.K.--Which government, or do both governments have responsible government? Randy.
- S. No.
- T. No! So you can say then here, or what can you say... if the legislature, the House of Commons refuses to pass a bill proposed by the prime minister and his cabinet what happens? Brian.
- S. Er. Who refuses to pass the bill to the legislature or House of Commons in...well, you have an election I suppose.
- T. Yes and what happens Len, if the congress says no to a bill the President proposes?--hmm--Is the president going to resign? Well, no.
- S. No.
- T. Well Linda? Do you know.
- S. I don't think so.
- T. He doesn't. No. As I said he could be a Democrat and Congress could be a Republican. He doesn't have to resign, they could vote against him consistently. Which is better?
- S. It'd be unstable, wouldn't it?
- T. Well this is the fear that some people have. But as a matter of fact what happens is that very often--this is much more the case in the United States than here--members do not vote according to their party nearly as much as they do in Canada. You see?
- S. Yes.

- T. So that when this situation occurs--and it has occurred many times--when Wilson went over to the peace conferences in 1919 he was a Democrat and his Congress back home was Republican. You see. So what you get here is a situation which is possible, but is possible to survive, to exist in it. Yes?
- S. In a sense, isn't the American way a little better because in Canada we find that, say with the experience of minority government for a whole year as we have for the last 5 years we find that parties in power are reluctant, with their minorities, to pass controversial legislation that might bring the downfall of the government. And that's the position in Canada--this is a sort of a political football--they're scared to try and think of this, and therefore lots of legislation can't get past, but in the States there's lots more.
- T. Tim.
- S. More checks on the government--each is more independent isn't it in the United States?
- T. Yes. This is a system of checks and balances and the president has certain controls over the president and the Supreme Court enters the picture here too. And one thing of course is that some people say that this tends to slow down the United States process here. George's point is perhaps well taken in that in this situation people are afraid to propose controversial legislation because of our minority government situation you were thinking of and therefore they won't do this. You have to work with the majority. Well is there anything wrong with the--getting a majority decision on legislation, you see?
- S. There is a threat of, if you get a dictatorial president, you don't want to get your hands in \_\_\_\_\_
- T. H'm. Well I'm sure this operates. Then of course you've got this problem here in our country where you've got a conflict of loyalty between what your constituents want - the people back home you know - and what the party wants perhaps. And if you've got that which way do you go. Or you might have your own principles at stake like Doug. Harkness whose principles were at stake when we got atomic warheads on our - when we refused to accept atomic warheads for our Bomarc missiles. The Conservative government refused this, you see, and Harkness resigned rather than sticking with a government which would do this--so,--the whole point is, of course, that in our system party loyalty is extremely important and you've got party whips to keep whipping you into shape, you know. Now over here party loyalty is not so significant so we've got this business of responsible government, you people, this is the part of our constitution which is not written down.

It's the parliamentary system, it's the cabinet system, as it is variously called, it is not written down. This is part of the unwritten constitution that we have. Are you with us here?

S's. Yes.

T. Good. So you can list off a whole bunch of contrasts eh? Bang, bang, bang.

S. Now!

T. Yes.  
(laughter)

S. Oh.

T. Contrasts or similarities?

S. Well there's cabinet...similar in both.

T. O.K., there is a similarity.

S. There's differences that, ah, the president doesn't necessarily represent the party that puts him in \_\_\_\_\_. In other words....

T. That's not quite it.

S. The Republican and (inaudible)

T. Beg your pardon.

S. He can be a Republican and have a Democrat with him.

T. Well, would he be elected by...I think what you misunderstand is the difference in ballots. Here's one ballot for the president, here's another ballot for the senators, here's another ballot..

S. Yes, I understand that.

T. Yeah. So what you're saying is that he could be a Democrat president and could have underneath him, in his legislature, a Senate and House of Representatives, which might be Republican. Okay this is a difference. This can't occur here, can't it? It just can't.

S. (Inaudible)

T. Okay, you people, let's go on to other contrasts and similarities. Let's go on and review them. Yeah?

S. Well, as another point about the States government, there

- T. Yeah, well I think this is true. You don't have to be so concerned about party loyalty, or you're not at any rate. Alright, there's that difference. Let's go on to some more please--Alright, residual power, where's the difference!
- S. Monarch.
- T. Yes, monarch. Where's another one? The constitution itself, where is the difference.
- S. Written versus?
- T. Written versus? An independent executive in contrast to dependent executive. Do you understand what I mean there? An independent executive in contrast to a dependent executive? Which, by the way, has an independent executive? Linda?
- S. The United States.
- T. That's right! It doesn't matter: he doesn't have to enjoy the support of his legislature. And the dependent one? Yes?
- S. Could the president if he is a Democrat; could he always choose a Democratic cabinet.
- T. Yes, he could always make sure the fellows in his cabinet were Democratic...he doesn't have to choose - he chooses them from industry; the former president of General Motors quite often gets into the cabinet. It has happened. Yes?
- S. Would another contrast be that Americans can alter the constitution where we cannot. We have to go to Britain.
- T. Yes. A good point. Excellent. We can only alter our constitution in purely federal matters. They can amend their own constitution although it's a very difficult procedure. Very few amendments have occurred in the United States. "How many" Fifteen amendments?

## Part II

So, let's then leave this and take one brief look at this business of division of powers again and...because I think some of you are worried about the fact that today in Canada we don't seem to have a very strong federal government and although I can't go through how all this happened, your feeling is justified. Our federal government is not particularly strong and it seems to become weaker with this procession of minority governments which we are having right now.

- S. And a procession of scandals.

- T. One could ask whether the government should be spending time on this. Well, anyway, one Conservative said, I read, he said that the country, the people of Canada, want to get down to the bottom of this whole thing and we're going to get right down to the bottom of this and see whose been sleeping with whom type-of-thing. (laughter) What has happened...I think what I can do... I was going to get out copies of the B.N.A. Act, I've got copies that I'll let you have a look at sometime. (at the chalkboard) There have been two articles that are important. Section 91 and section 92. Can anyone tell me which powers this one had to do with? Federal or provincial? No? It's probably a good thing to know. Section 91 is federal; it's federal powers. Section 92 are provincial. And I always remember section 93 in our act which gives education to the provinces, you see. This is a provincial responsibility; that's why if you move from here to Saskatchewan there is a difference in curriculum and different system. Now. Or if you go to Manitoba you'll find that there are no separate schools as we've got here. It changes from province to province. This then...there are sixteen powers here and what twenty?
- S. Six.
- T. Twenty six powers in here. Now the whole point is that in this particular section--the introduction to section 91-- it states that the federal government shall have power to provide for peace, order and good government for the country and they also go on to some indication of what residual power--the federal government has residual power (writes on board) residual power. And they have the power to provide peace, - order, - and good - government - for Canada. Now I mention this particular one because with residual power, with the veto power, with this statement here which is a bit vague--it seems that the federal government has got considerable power but there is one stickler here and this is the clause in the provincial group of powers - property - and with civil rights (writes on board). The provincial government shall have power to..ah--to--well it has the power over, I should say, property and civil rights. Now. The courts have taken a look and any argument that has occurred here and most arguments that have occurred between the two--now they would have arguments because the question would always be where does the provincial government's authority end and the federal government's begin? So there is bound to be arguments wherever you have a division of powers under a federal system. You can understand this! So what has happened is that where there has been arguments the courts have interpreted this very broadly--this one here (pointing) and they have included, therefore, a great many things under property and civil rights and have narrowed the federal government's power in their interpretation of the B.N.A. Act. The court in question here is the British court: the Judicial Committee of Privy Council. And they made this interpretation of it

once--in the 1930's I believe it was--and this is what they said when a case came up: in times of peace this clause - property and civil rights - will be interpreted and defined very broadly; and this one peace, order and good government - will not get too much power. In times of war, excuse me, in times of emergency they said, on the other hand, the federal powers should be interpreted broadly and the provincial powers in more narrow terms. And so one of the biggest factors, other than the fact that the French Canadian and there's been...regionalism is kind of characteristic of Canada because of geography, because of our cultural differences, but one of the big factors that has brought about more and more provincial authority has been the interpretation offered by the courts, you see. They haven't carried out the spirit of what the fathers of confederation wanted at all. They have not done this. They have interpreted this one, generally, in narrow terms and thus one broadly.--Well what do you think of that, Gordon?

- S. These rights of income tax, you know Quebec and Saskatchewan they're not listed on your income tax--what do they do, collect them right from the provincial tax at the same time?
- T. Well in that particular case, this is another history in itself what's happened. You see both the provincial governments and the federal government have the power to tax - direct tax-and income tax is a direct tax. So now, who is going to collect the income tax is the question. Well now, in Alberta's case, and in most of the provinces' case, who collects it is the federal government and then they give something like 19% of it back to the province of Alberta. But in some cases the provincial government also collects income tax.
- S. What's this tassel about a couple of months ago. Lesage wanted to make trade agreements by itself, Quebec by itself? or something.
- T. Yes. Well now, he is--this is--if he does--there are some areas of foreign policy that some Quebec people are saying they want. Now if he does, however, I think you will find that this is in contravention to the B.N.A. Act. This is not in keeping with the B.N.A. Act and this is one of the reasons probably that he has rejected the Fulton-Favreau formula that I was talking about yesterday, because he would like to see changes in the B.N.A. Act, and the Fulton-Favreau formula would, he felt, cause the thing to be too rigid. It wouldn't be possible constitutionally to amend the constitution.
- S. Is there anything that would justify him doing this?
- T. Well it's an expression of nationalism.

- S. Well I realize that, I know that this is what he is trying to express everything, but sometimes someone who is against the constitution will find a little loophole. Is there anything that can justify him taking this stand.
- T. Oh, the loophole. No. I don't think so--constitutionally.
- S. Is this what the fight's over?
- T. When Mr. Kierans, for example, wrote a letter to the United States in which he was complaining against the Guidelines, which are a fact you should know something about--the Guidelines, he was saying that--he was taking things into his own hands, because actually, the letter he wrote to the American Government should have gone to Ottawa, you see. There is kind of a foreign--this is a role of diplomacy and diplomacy is supposed to be under the control of the federal government. Mr. Kierans is only a provincial cabinet minister and he is protesting to a national government down there about a policy they've undertaken, you see. And Pearson had some sharp words this...Mike...and the letter was ignored--officially at any rate by the American government--Well, you people, what I would like to say in conclusion then, confederation is completed, your textbook completes it. Manitoba gets in by the Manitoba Act of 1870 and then they go on to British Columbia getting in because of a promise of railway--this was one reason. It was going to be built in ten years--it wasn't, but they stayed with us, and now there are separatists there too (laughter). I don't know whether they're thinking about this railway. I don't think so. And then we get Prince Edward Island because of the promise to help with the absentee landlordism situation - the fact that so many of the people of Prince Edward Island didn't own their own land and were tenants of absentee landlords. Also the promise of building a railway. So in 1873, P.E.I. comes in and then Alberta... oh, the purchase of Rupertsland in 1869 from the Hudson's Bay Company...and then the formation of Alberta, Saskatchewan. What date?
- S's 1905.
- T. 1905, they come in.
- S. In 1949, Newfoundland.
- T. In 1949, Newfoundland, and there you have ten provinces--just like that. Yeah?
- S. What purchases did the Hudson's Bay Company buy in Canada when they bought it.
- T. I don't know this.
- S's It's something about some purchases - a monopoly.



T. Well the Hudson's Bay Company had a monopoly. It said something in the original charter about all those rivers that drained into the Bay--that area which was drained by rivers going to the Hudson's Bay belonged to the Hudson's Bay Company. They extended their territory over into British Columbia--and into Washington and into Oregon.

### Part III

T. Alright now, what I want to do then is to get started here and let's just see how rapidly we can go through. Review begins. Starting with (1a), let's see how far along we can get. Linda.

T. The greatest storehouse of industrial minerals? Betty?

S-1 Is she supposed to answer? What was the question?

S-2 What was the question?

T. You said St. Lawrence Lowlands. St. Lawrence Lowlands. Greatest storehouse of industrial minerals, Betty? Gay?

S. Canadian Shield.

T. Yes. Main source of petroleum and cereal grains? Allan.

S. Western prairies.

T. Yes. The products of the maritime provinces of Canada, Elizabeth?

S. (Inaudible)

T. ?? contains the largest source of softwood lumber? Speak right out, please when you're giving your answers. Jim?

S. B.C.

T. B.C. Is that the name of a physiographic region? Alright, Leonard.

S. Cordillera.

T. Cordillera. Pine Point? Murray?

S. Lead and zinc ores.

T. Lead and zinc ores, yes. The major source, by the way, in Canada, Thompson, Manitoba, Brian?

S. Nickel refineries.

T. Nickel and nickel refineries. Just the regions here please, not the industry, Alright. Casea, Gordon?

S. Oh, that's. . .

T. Beg your pardon?

S. Asbestos.

T. Asbestos. Chamberville? Gary.

S. Iron.

T. Iron. Swan Hills? Gary.

S. Oil.

T. Oil - and?

S. Gas.

T. Gas. Where's the terminal of the inter-provincial pipeline? Betty----  
Beg your pardon?---Alright, Randy----

S. (Inaudible)

T. No! George.

S. Oh. It's in Alberta somewhere.

T. Alright, Linda--Edmonton.

S. Isn't it Redwater?

T. Alright, Redwater. It started at Redwater but the whole point is--one could ask which is further west--but it is Edmonton. Originally it was Redwater, but now it's Edmonton. Okay. Eastern Canada refining centre for Venezuelan crude petroleum? Rick.

S. Is it Sarnia?

T. No. Keep in mind the national, Canada's national oil policy (unfolds map of Canada) divides right at the Ottawa River. So Venezuelan oil comes in here and serves the eastern part of Canada. Our oils come down here to the Ottawa River valley--Where, do you suppose? Alright, Gary--Anybody? Take a guess, Art.

S. I think it goes to Montreal?

T. Right, Montreal. Alright, the site of the Canadian research centre for the peaceful use of nuclear energy? Murray.

S. Chalk River.

T. Chalk River. Is there another one?

S. White Shell.

T. White Shell. Where? It's a research centre--where is it please? What province? Anybody.

S. Manitoba.

T. Manitoba. White Shell, Manitoba. Near Winnipeg. Alright, site of Canada's chemical valley and of the federal government's synthetic rubber manufacturing plant? Randy.

S. I don't know that.

T. Alright, let's go on here. I'll go up and down rows, Jim. Do you know? Synthetic rubber? Get it from here. Elizabeth. Leonard?

S. Sarnia.

T. Sarnia. Yes. Chemical plants, synthetic rubber. Lakehead terminal for the shipment of Western Canadian products to the markets of Eastern Canada and Europe. Murray.

S. Fort William.

T. Fort William or?

S. Port Arthur.

T. "Geography influences the nature of our industries and our vocational emphasis." Alright, define geography--Alan.

S. It is a study of the lands, the rivers,....  
(Inaudible)

T. Define geography. The study of the land. What else? Well, you just take a look at Unit 1 and think of all the things we took up there.

S. It is how man's environment affects his living.

T. Alright. Yes.

S. It's how man's environment affects his living.

T. Geography is man's environment--both physical and man-made environment. If you want a word that's good, I think, it's space.

S. Well, actually we took it up in geography.

- T. Well, alright. It is the study of elements in space and their relationship to each other. A description - an explanation - if you like, of-the-elements-in-space-and-their-relationship-to-each-other. Alright, list two factors which account for the considerable diversity which exists in the cool temperate climate belts of Canada. Brian - Gordon - Gaye - Art - Gary.
- S. Northern latitude.
- T. Latitude?
- S. Well it's .....
- T. Alright, I agree. All except -- just one second here. When we're talking about the cool temperate belt (points to map) that's what we're talking about. I think, maybe, when you consider latitude, it perhaps is not such a factor because it does restrict it to cool temperate. If you're talking about physiographic...I was thinking it probably means all the way up here and you're right, of course, Eskimos and so on. If you're talking about this here - cool temperate belt - I don't think you're quite right. Okay. Gordon.
- S. The Westerlies and the winds coming from the Pacific, over the mountains.
- T. Alright. This accounts for the diversity?
- S. No.
- T. The diversity - it doesn't say what diversity.
- S. The diversity of climate.
- T. The considerable diversity. Alright. "Geography influences the nature of our industries and our vocational emphasis." Why do you have diversity in these industries and vocational emphasis in the cool temperatures - this is the question. Well - I suppose one of them has to do with natural resources, eh? Isn't that one? Oil here and in Saskatchewan to some extent. Now this provides a contrast or a diversity from agriculture. Natural resources would be one. Anything else? Okay, we'll leave it. Name three primary and secondary industries. You're the one, Gaye.
- S. There's primary and extractive - and secondary - (inaudible)
- T. You're confusing this with capital goods and consumer goods. Art, what's the distinction?
- S. Secondary suggest idea of farm products and agricultural goods, manufacturing goods and industry.

T. Primary suggest what? First or second.

S. First.

T. Right. Primary means first, and your first goods are those goods which are first produced. They are extracted from natural resources, I know, your fish, your fur, your farm products. Secondary goods, some refining has gone on. O.K. Your distinction. Enumerate two factors which influence development of industrial regions as an urban distributing centre -- O.K. Come on. Yea! If one would be the location of it, of its proximity of markets or not.

T. Yes, proximity to markets yes.

S. Proximity to the raw materials.

T. Then this is part of a market. Proximity to raw materials, ----- availability of capital. Alright, what I would like you people to do, if you want, you can get a '64 paper but I hope next day to finish this paper and start on the '64 and go on to '65. If you want '64 let me know.

END OF PERIOD

## Part II - Transition Matrices

TABLE A - 1

R SS 30 (M) Period 3 - Transition Matrix - Phase I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	2	9	0	0	6	4	1	1	0	0	0	1	24
2	0	4	2	0	0	1	1	4	16	1	1	2	2	34
3	0	7	50	2	1	8	12	1	11	1	0	2	2	97
4	0	0	1	2	0	3	1	0	0	0	0	0	0	7
5	0	1	0	0	3	0	1	0	1	0	0	0	0	6
6	0	3	8	1	0	71	5	1	4	0	0	0	0	93
7	0	5	2	1	1	0	9	0	18	0	3	3	0	42
8	0	1	8	0	0	0	0	4	0	0	2	0	0	15
9	20	7	11	0	1	1	7	1	15	2	0	1	1	67
10	0	1	0	0	0	1	0	0	1	1	0	1	0	5
11	0	0	0	1	0	1	1	2	0	0	17	1	0	23
12	4	2	2	0	0	1	1	0	0	0	0	19	1	30
13	0	1	4	0	0	0	0	1	0	0	0	1	0	7
14	24	34	97	7	6	93	42	15	67	5	23	30	7	450

T A B L E A - 2

R S S 30 (M) Period 3 - Adjusted Matrix - Base 1000 - Phase I<sup>1</sup>

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	4	20	0	0	13	9	2	2	0	0	0	2	53
2	0	9	4	0	0	2	2	9	35	2	2	4	4	75
3	0	15	111	4	2	18	27	2	24	2	0	4	4	215
4	0	0	2	4	0	6	2	0	0	0	0	0	0	15
5	0	2	0	0	7	0	2	0	2	0	0	0	0	13
6	0	7	18	2	0	158	11	2	9	0	0	0	0	207
7	0	11	4	2	2	0	20	0	40	0	7	7	0	93
8	0	2	18	0	0	0	0	9	0	0	4	0	0	33
9	44	15	24	0	2	2	15	2	33	4	0	2	2	149
10	0	2	0	0	0	2	0	0	2	2	0	2	0	11
11	0	0	0	2	0	2	2	4	0	0	38	2	0	51
12	8	4	4	0	0	2	2	0	0	0	0	42	2	67
13	0	2	9	0	0	0	0	2	0	0	0	2	0	15
14	53	76	216	16	13	207	93	33	149	11	51	67	15	1000

<sup>1</sup>Imbalance in entries in summary row and column due to rounding error.



T A B L E A - 3

R SS 30 (M) Period 3 - Transition Matrix - Phase II

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2	0	0	1	0	0	2	0	1	0	0	0	0	1	5
3	0	2	66	3	1	6	2	0	1	0	0	0	5	86
4	0	0	2	4	0	3	0	1	1	0	0	0	1	12
5	0	0	0	1	0	0	0	0	0	0	0	0	0	1
6	0	1	6	2	0	82	0	2	1	0	0	0	2	96
7	0	0	1	0	0	0	1	0	1	0	0	0	0	3
8	0	1	2	1	0	2	0	8	1	0	0	0	0	15
9	1	0	1	1	0	0	0	3	3	0	0	0	0	9
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	1	6	0	0	1	0	0	1	0	0	0	1	10
14	1	5	86	12	1	96	3	15	9	0	0	0	10	238

T A B L E A - 4

R S S 30 (M) Period 3 - Adjusted Matrix - Base 1000 - Phase II<sup>1</sup>

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	0	4	0	0	0	0	0	0	0	0	0	0	4
2	0	0	4	0	0	8	0	4	0	0	0	0	4	21
3	0	8	278	13	4	25	8	0	4	0	0	0	21	363
4	0	0	8	17	0	12	0	4	4	0	0	0	4	50
5	0	0	0	4	0	0	0	0	0	0	0	0	0	4
6	0	4	25	8	0	346	0	8	4	0	0	0	8	405
7	0	0	4	0	0	0	4	0	4	0	0	0	0	13
8	0	4	8	4	0	8	0	34	4	0	0	0	0	63
9	4	0	4	4	0	0	0	13	12	0	0	0	0	38
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	4	25	0	0	4	0	0	4	0	0	0	4	42
14	4	20	362	50	4	405	13	63	37	0	0	0	42	1000

<sup>1</sup> Imbalance in entries in summary row and column due to rounding error.

T A B L E A - 5

R S S 30 (M) Period 3 - Transition Matrix - Phase III

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	5	7	0	0	1	12	0	0	0	0	0	1	26
2	1	6	4	0	0	0	4	0	23	1	0	2	8	49
3	2	4	18	1	0	2	8	0	1	0	0	2	3	41
4	0	0	1	2	0	0	0	0	0	0	0	0	0	3
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	1	0	0	7	1	1	0	0	0	0	0	10
7	0	23	4	0	0	0	7	0	4	0	0	0	2	40
8	0	0	2	0	0	0	0	0	0	0	0	0	0	2
9	22	2	2	0	0	0	5	0	5	0	0	0	0	36
10	0	0	0	0	0	0	0	0	1	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	1	0	0	0	0	2	0	0	0	0	5	1	9
13	1	8	2	0	0	0	1	1	2	0	0	0	8	23
14	26	49	41	3	0	10	40	2	36	1	0	9	23	240

T A B L E A - 6

R S S 30 (M) Period 3 - Adjusted Matrix - Base 1000 - Phase III<sup>1</sup>

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	21	29	0	0	4	50	0	0	0	0	0	4	109
2	4	25	17	0	0	0	17	0	96	4	0	8	33	205
3	8	17	75	4	0	8	33	0	4	0	0	8	12	171
4	0	0	4	8	0	0	0	0	0	0	0	0	0	12
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	4	0	0	29	4	4	0	0	0	0	0	41
7	0	96	17	0	0	0	29	0	17	0	0	0	8	167
8	0	0	8	0	0	0	0	0	0	0	0	0	0	8
9	92	8	8	0	0	0	21	0	21	0	0	0	0	150
10	0	0	0	0	0	0	0	0	4	0	0	0	0	4
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	4	0	0	0	0	8	0	0	0	0	21	4	38
13	4	33	8	0	0	0	4	4	8	0	0	0	33	96
14	109	205	171	12	0	41	167	8	150	4	0	38	96	1000

<sup>1</sup> Imbalance in entries in summary row and column due to rounding error.

### Part III - Discussion

Part I of this Appendix contains a transcript of one lesson observed and taped in the course of this study. Part II contains the transition matrices and matrices adjusted to a base 1,000 for the three parts of the lesson which appeared to fall out and represent specific behaviors from teacher R's repertoire.

These changes in behavior were clearly marked in the lesson and the transcript. At the end of part I the teacher said "So, let's then leave this and take one brief look at this business of division of powers again." Part II ended fairly clearly when the teacher said "Alright now, what I want to do then is to get started here and just let's see how rapidly we can get through. Review begins." An independent observer<sup>1</sup> independently characterized these three parts as follows:

Phase 1. Question-Answer interchange with teacher controlling process entirely (asking questions and indicating correctness of answers) while students were largely limited in their response to the particular questions which only the rare initiation of a further question by an occasional student. The teacher provided some incidental amplification at the odd point, but the amount of student-teacher talk alternates fairly regularly at short intervals. The phase appears to be a "factual" review in the light of the apparent ease with which students seem to come up with the "correct" answers.

Phase 2. This phase appears to introduce new material. The teacher is trying to develop the topic and is treating it expositively through

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<sup>1</sup> Dr. J.O. Fritz, University of Calgary.

lecturing with the occasional questions at the class. The teacher engaged in more sustained presentation; however, students, relative to phase 1, seem to reveal more frequent initiation of questions.

Phase 3. The teacher shifted to definite review of material (Geography, Economics) with highly specific question-answers of fact with regular alternation of teacher-student talk. The teacher controlled student response behaviors completely.

Tables A-2, A-4 and A-6 present the adjusted, i.e. to a base 1,000, summing rows of the three matrices representing the parts of the period. Table A-7 and Figure A-1 set out these adjusted totals in the order in which the gross categories appeared on the six Factors reported in Chapter 6. Gross visual comparison of the three profiles in the polygon shows clear differences between the phases of this period. These differences, interpreted in the light of the descriptive categorization of the phases reported above, offer support for a claim that the Force interaction instrument and the interpretation of its underlying factor structure outlined above do have face validity.

There are more than fifty entries on the adjusted matrix for Phase 2 on items 4 and 8 (i.e. "teacher conjecture" and "student question") which represent Factor 2 - "student questioning behavior." Phases 1 and 3 do not report more than fifty entries on the adjusted matrices for this behavior. There are on the other hand fewer than fifty entries from Phase 2 on item 1, "teacher verdictive," "teacher question"

T A B L E A - 7

SUMMING ROWS OF PHASES - ADJUSTED TO BASE 1000 - BY FACTORS

Factor	<u>I</u>			<u>II</u>			<u>III</u>			<u>IV</u>		<u>V</u>	<u>VI</u>	
Categories	1	7	9	4	5	8	3	5	6	2	12	10	11	
Phase	1	53	93	11	16	13	33	206	13	207	76	67	11	51
2	4	13	37	50	4	63	362	4	405	16	0	0	0	
3	109	167	151	12	0	8	167	0	41	205	38	4	0	

T A B L E A - 8

TRANSITIONS IN ROW 9 COLUMNS

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>
Phase														
1	20	7	11	0	1	1	7	1	15	2	0	1	1	67
2	1	0	1	1	0	0	0	3	3	0	0	0	0	9
3	22	2	1	0	0	0	5	0	5	0	0	0	0	35

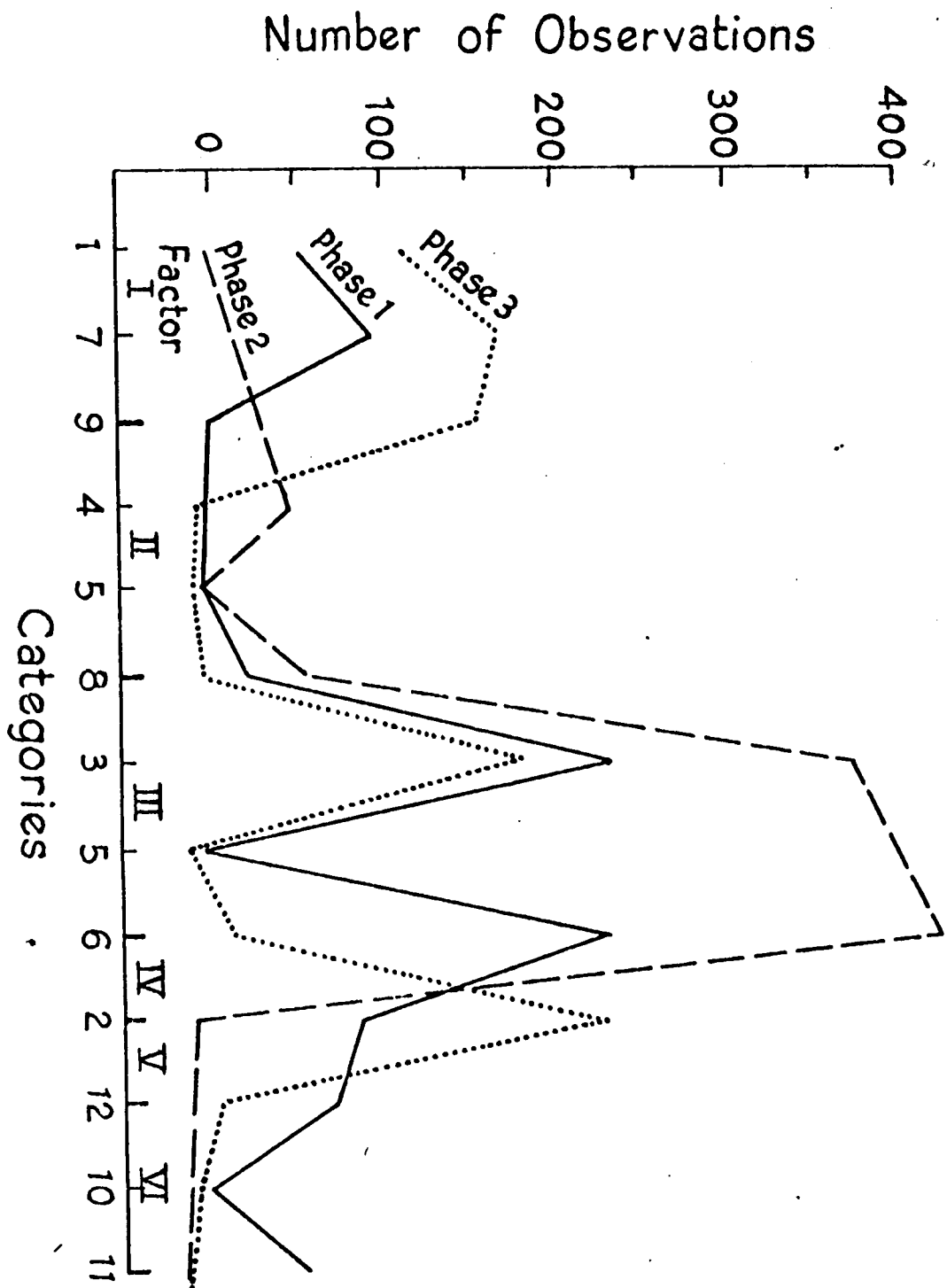
T A B L E A - 9

TRANSITIONS IN ROW 9 - ADJUSTED TO BASE 1000

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>
Phase														
1	44	15	24	0	2	2	15	2	33	4	0	2	2	149
2	4	0	4	4	0	0	0	13	12	0	0	0	0	38
3	92	8	4	0	0	0	21	0	21	0	0	0	0	146



Fig. A-1 Summary of Phases  
Adjusted to Base 1000 - By Factors



and "student informs," while Phases 1 and 3 figure prominently on all these items. However, the two Phases i.e. 1 and 3, have quite different profiles on categories 1, 7 and 9. Phase 3 shows similar proportions of teacher questions and student answers and a large number of teacher verdictives, a pattern evident in the transcript, while Phase 1 suggests much longer student response to questions and a much smaller emphasis by the teacher on verdictive judgments.

A similar pattern of differences between Phases 1 and 3 can be observed by inspection of the transition shifts that are incorporated in each cell of the transition matrix. No extensive attempt has been made in the course of this study to explore the body of the transition matrices prepared for the Markov analysis. An example can however be presented here to illustrate the power of this analysis as well as its appropriateness for interpretation of the differences of behavior between the different methods a teacher might have in his repertoire.

The transitions for row 9 are reported in Tables A-8 and A-9. Each figure (which is adjusted to the base thousand) represents the number of times when the teacher followed up a student's information statement with behaviors of all types. Thus, cell 9 - 9 represents continuing student informing; cell 9 - 1 represents the number of transitions from student informing to teacher verdictive; 9 - 2 the number of transitions from student informing to teacher exercitive and so on. All cells from the transition matrix can be examined and interpreted in this way.

The usefulness of this analysis can be illustrated by an examination of this row. The row, and the behavior are, of course, characteristic of Phases 1 and 3 and not of Phase 2. This gross difference is in itself revealing, but the power of examination of the transition matrix is seen most clearly in the transitions. There are significant differences in the transitions 9 - 1, 9 - 2, 9 - 3, 9 - 7, 9 - 8, 9 - 0.

The transition 9 - 1 can be used to characterize the two lesson phases; in Phase 3, the teacher followed up a student informing statement with an evaluation of that statement almost twice as many times as he did in Phase 2. This rapid follow-up of the student's informing statement by an evaluation is characteristic, as can be seen from the transcript, of the teacher's drilling behavior. This can be compared with the behavior of cell 9 - 2, where the teacher follows up the student's informing statement by an exercitive. This behavior is again characteristic of Phase 1 rather than Phase 3. If the exercitive is interpreted as a "go on" or as an encouragement of any sort for the student to speak, it is clear that the pattern of behavior which is characterized by the cell is quite different from that represented by cell 9 - 1. The difference between Phases 1 and 3 is even more pronounced in the case of cell 9 - 3, which represents the follow-up of the students with information. This is characteristic of Phase 2 in marked contrast to Phase 3, where the teacher follows the student's answer in this way comparatively infrequently. These two cells between them

characterize some of the essential differences between the teacher's behavior in Phases 1 and 3, and the methods or "games" of teaching behavior which those phases represent.

Similar analysis could be undertaken of any of the rows of the transition matrices which have significant numbers of entries. By undertaking an analysis of this type in each of the row-columns of the transition matrices, a fairly complete composite picture of the communication behavior in a period could be built up. However, the transition matrices present a mass of data, more indeed than can be interpreted or made sense of in this fashion. Flanders solved the problem of interpretation in part by bracketing areas of the matrix and characterizing these areas in certain ways. He did this on the basis of an inspection of the matrix of the type that has been begun here and deduction from the pre-conceptions he brought to his analysis of those areas which seemed logically to hang together and represent meaningful behaviors. This approach is perfectly defensible, and the areas which Flanders isolated were chosen, of course, in a manner consistent with his general concern for the dimension of directness - indirectness. It is, however, a more or less intuitive approach and Flanders did not establish any statistically coherent relationships between his areas. It would seem necessary, as a further development of this study and of this argument, to explore statistically and to some extent objectively the movement and co-variance of transition cells in the matrix. This would offer, in addition, a much more useful description of classroom

behavior than that presented in Chapter 6 which was based on quasi-factor analysis of the summing rows only. Such an attempt was begun in the course of the study, but the difficulties posed by applying standard parametric techniques to data with uncertain mathematical and numerical properties suggested that this would be more suitable for a subsequent investigation.

APPENDIX B

THE STATISTICAL COMPARISON OF CLASSROOM OBSERVATIONS

THE STATISTICAL COMPARISON OF CLASSROOM OBSERVATIONS

The methodology and approach to the statistical treatment of classroom behavior measures involves a number of important, though difficult technical issues. Different students have used both parametric and non-parametric methods for this analysis, with the exponents of the virtues of one model castigating the exponents of the other for breached assumptions. Medley and Mitzel have vigorously advocated the use of analysis of variance and covariance as the basic statistical model<sup>1</sup> while other writers have claimed that the use of the distribution of F in such analysis is completely inappropriate. The second school argues that non-parametric techniques only are appropriate for the types of data typically gathered in observational studies. However, statistics such as the Pearson chi-square which make assumptions of independence and discreteness of observations<sup>2</sup> present their proponents with difficulties as great as those attributed by these practitioners to parametric methods. Bales pointed out that classified events of communication are interdependent; each single event (for example, a question) will affect the probability that some other event (for example, an answer) will follow.<sup>3</sup> In a

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<sup>1</sup> Medley and Mitzel, "Measuring Classroom Behavior," in Gage, Handbook, pp. 325-26.

<sup>2</sup> William L. Hays, Statistics for Psychologists (New York: Holt, Rinehart and Winston, 1963) p. 583; see also pp. 596-98.

<sup>3</sup> R.F. Bales, Interaction Process Analysis (Cambridge, Mass.: Addison-Wesley, 1950); see also Flanders, op. cit., pp. 30-33.

theoretical paper directly prompted by Flanders' work J.H. Darwin of the Applied Mathematics Laboratory of the New Zealand Department of Scientific and Industrial Research explored the effects that this interdependence has on the results of a statistical comparison of sets of coded classroom observations. He assumed that communication events were one-dependent and therefore amenable to standard Markov (or Markoff) statistical procedures. Assuming this and using a Markov procedure as a method of analysis he found that the regular chi-square criterion for the  $2 \times 6$  contingency table was twice as large as that derived from the Markov procedure. In the simplest case of a  $2 \times 2$  contingency table the difference between the regular chi-square and Darwin's Markov test can be represented by a multiplier which, when taken from the chi-square, makes it likely that the null hypothesis will be rejected when it should in fact be accepted. In using the regular chi-square there is a risk of claiming more significance than there is in the result of any test.<sup>4</sup>

Paradoxically, however, this weakness of conventional statistical tests has become an advantage. If it is assumed that interaction sequences are one-dependent, at worst a better assumption than zero-dependence, they then become isomorphic to a Markov chain with the practical consequence

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<sup>4</sup> J.H. Darwin, "Note on the Comparison of several realizations of a Markoff Chain," Biometrika, XLVI, 1959, pp. 417, 419. See also Flanders, op. cit., pp. 30-33.



that the statistics of Markov processes can be applied to analysis. At the same time the conventional Markov matrix form offers a practical and parsimonious descriptive method for recording and describing small fragments of the sequence of events in the classroom.

### The Markov Model<sup>5</sup>

A Markov chain is a mathematical model for describing a process that moves in a sequence of steps through a set of states. It is supposed that at each time,  $t_r$ , a variate  $x$  can take on one of a finite number of possible values  $x_1, x_2, x_3, \dots, x_n$ , representing the possible states of the system. The probability that  $x$  changes from  $x_j$  to  $x_k$  between time  $t_{r-1}$  and  $t_r$  can be expressed in matrix notation as  $p_{jk}$ , and the matrix  $P = (p_{jk})$  called the transition matrix.

This can be simply illustrated. If it is assumed that a classroom can be in any one of three states, the teacher talks, (T), a student talks (S), or there is silence (N), a three state matrix can be formed in which each cell represents not a simple state, but the transition from state to state; from one time,  $t_{r-1}$  to a second time,  $t_r$ ; a sequence of states on such a time grid

T, T, S, S, N, S, T, T, N, T

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<sup>5</sup> See John G. Kemeny and J. Laurie Snell, Mathematical Models in the Social Sciences (Ginn: Boston, 1962), ch. 1.

observed in a classroom can be recorded in a transition matrix which is then amenable to Markov analysis. Each call entry refers to the transition from state to state. Thus T T S S N would be represented by four entries in the transition matrix with the first term of each bracket indicating the row, the second, the column. Figure B.1 represents the matrix containing the sum of the transitions in the above sequence.

Fig. B.1

	T	S	N
T	11 <sub>2</sub>	1 <sub>1</sub>	1 <sub>1</sub>
S	1 <sub>1</sub>	1 <sub>1</sub>	1 <sub>1</sub>
N	1 <sub>1</sub>	1 <sub>1</sub>	0

Simple Transition Matrix

Darwin has developed a series of tests which can be applied to transition matrices of this form and one of these tests, a test of the equality of  $r$  sets of transition probabilities  $p_{jk}$ , is used in this study.

### The Darwin Test

The properties of Markov chains are well known, and Darwin extended the work of earlier statisticians who had demonstrated that in a long chain of transitions the moves from state  $j$  to state  $k$  are approximately normally distributed with known means, variances, and other properties. He developed a

likelihood ratio criterion to test the null hypothesis that two or more transition matrices are the same:

$$2 \left( \sum_{(K)} n_{jki} \log_e n_{jki} - \sum_{(L)} n_{j.1} \log_e n_{j.1} - \sum_{(M)} n_{jk.} \log_e n_{jk.} + \sum n_{j..} \log_e n_{j..} \right) \quad B.1$$

A dot in place of suffix means that summation has been carried out over the replaced variable. It can be demonstrated that this criterion has the same value as the sum of  $\underline{s}$  chi-square type criteria for  $\underline{s}$  ( $\underline{r} \times \underline{s}$ ) contingency tables and the distribution of criterion B.1 is therefore that of chi-square with  $\underline{s} (\underline{r} - \underline{1}) (\underline{s} - \underline{1})$  degrees of freedom where  $\underline{s}$  is the number of categories and  $\underline{r}$  is the number of matrices. The criterion can be converted to a normal score  $\underline{z}$  as follows:

$$\underline{z} = \sqrt{2X^2} - \sqrt{2n - 1} \quad B.2$$

where  $\underline{n} = \underline{s} (\underline{s} - \underline{1}) (\underline{r} - \underline{1})$ , and  $\underline{n}$  is degrees of freedom.

#### Application of the Darwin Test

This test is simply applied. Flanders breaks the steps down as follows:

(1) Individual matrices with states 1, 2, ..., N; A, B, ..., N are prepared; there N is the total number of categories.

(2) A summed matrix S, is prepared which is the sum of the single matrices A, B, ..., N, there N is the total number of

matrices. The addition is performed cell by cell, i.e.,

$$\begin{array}{ccccccc} A + B & \dots & N & A + B & \dots & N & \dots & A + B & \dots & N \\ 1,1 & 1,1 & & 1,1 & 1,2 & 1,2 & 1,2 & n,n & n,n & n,n. \end{array}$$

(3) The first term of (B.1) is found by multiplying each cell frequency of each of matrices A,B...N by its own natural logarithm and summing these products. This can be represented by K.

(4) The second term of (B.1) is found by multiplying each row total of each of A,B, ...N; the sum can be termed L.

(5) The third term of (B.1) is found by multiplying each cell frequency of matrix S by its natural logarithm and adding the  $n^2$  products. The total can be represented by a third term M.

(6) The fourth term of (B.1) is found by multiplying each row total of S by its natural logarithm and adding these products. The total can be termed N.

(7) The terms are combined as in formula (B.1):

$$2(K - L - M + N).$$

This procedure and the necessary compilation of matrices has been programmed<sup>6</sup> so that both the compilation of matrices and the statistical analysis can be entirely carried out by computer.

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<sup>6</sup> The program was written initially by Dr. S. Hunka, Division of Educational Research Services, University of Alberta and subsequently modified by Mr. C. Brown, University of Alberta.

The University of Alberta IBM 7040 Computing System, The University of Toronto Institute of Computer Science IBM 7094 Computing System, and the Ontario Department of Highways IBM 7044 System were used in the course of the study.

### Problems in the Darwin Procedure

Degrees of freedom in the application of Darwin's test are calculated from  $\underline{s}(\underline{r} - 1)$  ( $\underline{s} - 1$ ) where  $\underline{s}$  is the number of categories and  $\underline{r}$  is the number of matrices. A row with no entries, whether the result of a category that is not in fact used or not used as a result of a statistically or logically meaningful frequency affects the calculation of degrees of freedom. In the development of the Force instrument nineteen categories were initially hypothesized with an implication in the two matrix case of 342 degrees of freedom. Only thirteen of these categories functioned regularly with an implicit df of 156. The consequences of these calculations are significant. In the analysis of one set of matrices chi-square equalled 207.844 with a z-score at df 156 of 2.753. If the df were 342 z would equal -5.746. The value of z at the .05 level of significance is 1.96:

Zero cell entries present theoretical as well as practical problems. Darwin's likelihood ratio criterion is closely related to tests of independence in contingency tables where  $-2 \log \lambda$  (where  $\lambda$  is the likelihood ratio) is approximately distributed as chi-square with  $(\underline{r} - 1)$  ( $\underline{s} - 1$ ) degrees

of freedom. It is a requirement of such tests that each cell must have a reasonable number of entries. It seems that this requirement is satisfied insofar as the theoretical basis of the Darwin statistic is concerned if the rows and columns of the matrices consistently have significant entries. The test is not substantially weakened by the absence of entries in individual cells.<sup>7</sup> The test built into the program by which cells with zero entries are ignored is profitable statistically in that the probability value of zero  $\log_e$  tends more often to zero than it does to infinity.

In addition Darwin's test shares a further problem with all chi-square tests of association. If the total number of entries in a matrix is large, as it must be for useful applications of the tests, virtually any potentially significant departure from the expected relationship between the two elements being tested will show up as significant. In the application of the Darwin test in this study  $N$  can reach over 3,000; because little is known of the practical limitations and behavior of this test nothing can be said about the effect of  $N$ 's of this size on the results that are given.

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<sup>7</sup> These observations are the result of consultations with Dr. J.R. McGregor, Department of Mathematical Statistics, University of Alberta. See also A.M.F. Mood, Introduction to the Theory of Statistics (New York: McGraw-Hill, 1950), chs., 10, 12, Darwin, op. cit., and references cited therein.

## APPENDIX C

THE CATEGORIES OF THE BELLACK CLASSIFICATION OF  
"THE LANGUAGE OF THE CLASSROOM."

## THE BELLACK CLASSIFICATION SYSTEM

### Analysis of the Transcripts\*

- (1) SPEAKER: indicates source of utterance  
Teacher (T); Pupil (P); Audio-Visual Device (A)
  
- (2) TYPE OF PEDAGOGICAL MOVE: reference to function of move  
Initiatory Moves  
Structuring (STR): sets context for subsequent behavior, focuses, launches  
Soliciting (SOL): directly elicits verbal, physical, or mental response; coded in terms of response expected  
Reflexive Moves  
Responding (RES): fulfills expectations of solicitation; bears reciprocal relation only to solicitation  
Reacting (REA): accepts, rejects, expands, modifies; occasioned by previous move but not directly elicited; summaries or reactions to more than one previous move coded REA  
Not Codable (NOC): function uncertain because tape inaudible
  
- (3) SUBSTANTIVE MEANING: Reference to subject matter topic. (Based on a content analysis of the text)<sup>a</sup>  
Trade (TRA)  
 Trade--Domestic and International (TDI)  
 Trade--Money and Banking (TMB)  
 Trade--Who Trades with Whom (TWH)  
Factors of Production and/or Specialization (FSP)  
 Factor of Production--Natural Resources (FNR)  
 Factor of Production--Human Skills (FHS)  
 Factor of Production--Capital Equipment (FCE)  
 Factors Other Than Natural Resources, Human Skills, and Capital Equipment Occurring In Discussion of Reasons for Trade (FRE)  
Imports and/or Exports (IMX)  
Foreign Investment--General (FOR)  
 Foreign Investment--Direct (FOD)  
 Foreign Investment--Portfolio (FOP)

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<sup>a</sup> James D. Calderwood, International Economic Problems, Minneapolis, Curriculum Resources Inc., 1961.

\* Underlining indicates actual coding terminology.



Barriers to Trade (BAR)  
   Barrier--Tariffs (BAT)  
   Barrier--Quotes (BAQ)  
   Barrier--Exchange Control (BAE)  
   Barrier--Export Control (BAX)  
   Barrier--Administrative Protectionism (BAA)  
   Promoting Free Trade (PFT)  
   Relevant to Trade (REL)  
   Not Trade (NTR)

- (4) SUBSTANTIVE-LOGICAL MEANING: reference to cognitive process involved in dealing with the subject matter under study
- Analytic Process: proposed use of language or established rules of logic
- Defining-General (DEF): defining characteristics of class or term with example of items within class explicitly given
- Defining-Denotative (DED): object referent of term
- Defining-Connotative (DEC): defining characteristics of class or term
- Interpreting (INT): verbal equivalent of a statement, slogan, aphorism, or proverb
- Empirical Process: sense experience as criterion of truth
- Fact Stating (FAC): what is, was, or will be without explanation or evaluation; account, report, description, statement of event or state of affairs
- Explaining (XPL): relation between objects, events, principles; conditional inference; cause-effect; explicit comparison-contrast; statement of principles; theories or laws
- Evaluative Process: set of criteria or value system as basis for verification
- Opining (OPN): personal values for statement of policy, judgment or evaluation of event, idea, state of affairs; direct and indirect evaluation included
- Justifying (JUS): reason or argument for or against opinion or judgment
- Logical Process Not Clear (NCL): cognitive process involved not clear
- (5) NUMBER OF LINES IN 3 AND 4 ABOVE
- (6) INSTRUCTIONAL MEANINGS: reference to factors related to classroom management
- Assignment (ASG): suggested or required student activity; reports, tests, readings, debates, homework, etc.
- Material (MAT): teaching aids and instructional devices

Person (PER) : person as physical object or personal experiences

Procedure (PRC) : a plan of activities or a course of action

Statement (STA) : verbal utterance, particularly the meaning, validity, truth or propriety of an utterance

Logical Process (LOG) : function of language or rule of logic; reference to definitions or arguments, but not presentation of such

Action-General (ACT) : performance (Vocal, non-vocal, cognitive, or emotional) the specific nature of which is uncertain or complex

Action-Vocal (ACV) : physical qualities of vocal action

Action-Physical (ACP) : physical movement or process

Action-Cognitive (ACC) : cognitive process, but not the language or logic of a specific utterance; thinking, knowing understanding, listening

Action-Emotional (ACE) : emotion or feeling, but not expression of attitude or value

Language Mechanics (LAM) : the rules of grammar and/or usage

- (7) INSTRUCTIONAL-LOGICAL MEANING : reference to cognitive processes related to the distinctly didactic verbal moves in the instructional situation

Analytic Process : see (4) above

Defining-General (DEF)

Defining-Denotative (DED)

Defining-Connotative (DEC)

Interpreting (INT)

Empirical Process : see (4) above

Fact Stating (FAC)

Explaining (XPL)

Evaluative Process

Opining (OPN) : see (4) above

Justifying (JUS) : see (4) above

Rating : reference to metacommunication; usually an evaluative reaction (REA)

Positive (POS) : distinctly affirmative evaluation

Admitting (ADM) : mild or equivocally positive evaluation

Repeating (RPT) : implicit positive evaluation when statement (STA) is repeated by another speaker; also for SOL to repeat vocal action (ACV)

Qualifying (QAL) : explicit reservation stated in evaluation; exception

Not Admitting (NAD) : evaluation which rejects by stating the contrary; direct refutation or correction excluded

Negative (NEG) : distinctly negative evaluation

Positive/Negative (PON) : SOL requesting positive or negative evaluation

Admitting/Not Admitting (AON) : SOL asking to permit or not permit procedure or action  
 Extralogical Process : SOL expecting physical action or when logical nature of verbal response cannot be determined.

Performing (PRF) : asking, demanding; explicit directive or imperative

Directing (DIR) : SOL with or without stated alternatives; asking for directive, not permission for specific action

(8) NUMBER OF LINES IN 6 AND 7 ABOVE:

Each pedagogical move is coded as follows:

(1) / (2) / (3) / (4) / (5) / (6) / (7) / (8)

- (1) Speaker
- (2) Type of Pedagogical Move
- (3) Substantive Meaning
- (4) Substantive-Logical Meaning
- (5) Number of Typescript Lines in (3) and (4)
- (6) Instructional Meaning
- (7) Instruction-Logical Meaning
- (8) Number of Typescript Lines in (6) and (7)

Coding the Protocols

The following excerpt from one of the coded protocols illustrates the coding procedures and interpretations of the coded information.

EXCERPT FROM PROTOCOL

Teacher (Move #1) : Now, in order to pacify, or help satisfy, certain groups in American industry and American politics who want high protective tariffs, or who are clamoring for protection, we have inserted into our reciprocal agreements two--what you might call--safeguards which are coming up now. (Move #2) What have we inserted in here to give an element of protection or to stifle the outcries of American businessmen who want protection? Two clauses which we call . . .? Yes?

Pupil (Move #3) : The peril point and the escape clause.

Teacher (Move #4) : Right. The peril point and the escape clause.

CODE

Move #1 T/STR / BAT / XPL / 8 / - / - / -

Move #2 T/SOL / BAT / FAC / 4 / - / - / -

Move #3 P/RES / BAT / FAC / 1 / - / - / -

Move #4 T/REA / BAT / - / - / STA / POS / 1

### INTERPRETATION

The teacher focuses on a substantive area by explaining something having to do with tariffs to the extent of seven lines (Move #1). He then solicits for three lines with the expectation that a factual response on tariffs will be given (Move #2). A pupil gives a one-line response by stating a fact about tariffs (Move #3). The teacher positively evaluates the statement by the pupil (Move #4).

The entire segment of discourse is an example of a teacher-initiated cycle (STR RES REA).

### PEDAGOGICAL MOVES

Structuring. Structuring moves serve the pedagogical functions of focusing attention on subject matter or classroom procedures and launching interaction between students and teachers. They set the context for subsequent behavior or performance. For example, teachers frequently begin a class period with a structuring move in which they focus attention on the topic or problem to be discussed during that session.

Soliciting. Moves in this category are designed to elicit a verbal response, encourage persons addressed to attend something, or elicit a physical response. All genuine questions are solicitations, as are commands, imperatives and requests.

Responding. These moves bear a reciprocal relationship to soliciting moves and occur only in relation to them. Their pedagogical function is to fulfil the expectation of soliciting moves. Thus, students' answers to teachers' questions are classified as responding moves.

Reacting. These moves are occasioned by a structuring, soliciting, responding, or another reacting move, but are not directly elicited by them. Pedagogically, these moves serve to shape or mould classroom discussion by accepting, rejecting, modifying or expanding what has been said previously. Reacting moves differ from responding moves, in that while a responding move is always directly elicited by a solicitation, preceding moves serve only as the occasion for reactions.

**APPENDIX D**

**TOTALLED MATRICES - PROCEDURAL AND FORCE**

## A P P E N D I X    D

### Tables

D - 1 A SS 30	- Total Matrix - First Four Periods - Procedural
D - 2 A SS 20	- Total Matrix - First Four Periods - Procedural
D - 3 A SS 10	- Total Matrix - First Four Periods - Procedural
D - 4 B SS 20 (1)	- Total Matrix - First Four Periods - Procedural
D - 5 B SS 20 (2)	- Total Matrix - First Four Periods - Procedural
D - 6 B SS 10	- Total Matrix - First Four Periods - Procedural
D - 7 R SS 30 (M)	- Total Matrix - First Four Periods - Procedural
D - 8 R SS 30 (D)	- Total Matrix - First Four Periods - Procedural
D - 9 R Soc	- Total Matrix - First Four Periods - Procedural
D - 10 A SS 30	- Total Matrix - First Four Periods - Force
D - 11 A SS 20	- Total Matrix - First Four Periods - Force
D - 12 A SS 10	- Total Matrix - First Four Periods - Force
D - 13 B SS 20 (1)	- Total Matrix - First Four Periods - Force
D - 14 B SS 20 (2)	- Total Matrix - First Three Periods - Force
D - 15 B SS 10	- Total Matrix - First Four Periods - Force
D - 16 R SS 30 (M)	- Total Matrix - First Four Periods - Force
D - 17 R SS 30 (D)	- Total Matrix - First Four Periods - Force
D - 18 R Soc	- Total Matrix - First Four Periods - Force

T A B L E D - 1

A SS 30 - Total Matrix - First Four Periods - Procedural

	1	2	3	4	5	6	7	8	9	10	11
1	131	15	8	6	2	0	8	3	1	6	180
2	6	28	0	0	0	0	2	22	2	11	71
3	1	8	3	0	0	0	0	3	0	3	18
4	0	0	0	0	0	0	0	4	0	2	6
5	9	1	2	0	1	0	0	1	0	0	14
6	2	0	0	0	0	1	0	0	0	0	3
7	7	5	0	0	0	0	38	0	2	5	57
8	8	7	5	0	11	1	2	32	0	2	68
9	4	1	0	0	0	1	0	0	0	0	6
10	12	6	0	0	0	0	7	3	1	17	46
11	180	71	18	6	14	3	57	68	6	46	469

T A B L E D - 2

A SS 20 - Total Matrix - First Four Periods - Procedural

	1	2	3	4	5	6	7	8	9	10	11
1	881	56	72	17	8	0	8	10	31	60	1143
2	44	27	5	5	0	1	2	38	12	35	169
3	13	19	18	0	0	0	0	54	1	43	148
4	7	6	0	24	2	0	0	11	0	11	61
5	47	6	10	1	2	0	0	0	10	6	82
6	7	2	0	0	0	0	0	4	7	0	20
7	9	5	2	0	0	0	12	2	2	4	36
8	26	11	19	5	52	9	9	61	2	11	205
9	27	3	6	3	17	10	1	2	62	3	134
10	82	34	17	6	1	0	3	23	7	81	254
11	1143	169	149	61	82	20	35	205	134	254	2252



T A B L E D - 3

A SS 10 - Total Matrix - First Four Periods - Procedural

	1	2	3	4	5	6	7	8	9	10	11
1	453	36	21	10	2	1	9	4	8	12	556
2	18	50	0	1	0	0	4	30	22	16	141
3	3	10	17	0	1	0	0	10	0	6	47
4	3	2	0	10	0	0	0	8	2	5	30
5	22	4	2	5	10	0	2	2	11	1	59
6	4	2	0	0	0	1	1	0	0	0	8
7	8	8	0	2	1	0	41	0	3	5	68
8	11	8	6	1	25	2	3	53	1	4	114
9	12	11	0	1	19	4	1	1	141	4	194
10	22	10	1	0	1	0	7	6	6	18	71
11	556	141	47	30	59	8	68	114	194	71	1288

T A B L E D - 4

B SS 20 (1) - Total Matrix - First Four Periods - Procedural

	1	2	3	4	5	6	7	8	9	10	11
1	901	38	140	18	6	3	7	14	85	130	1342
2	22	9	8	0	0	1	0	43	11	35	129
3	38	24	26	1	1	0	0	103	3	73	269
4	7	9	2	4	0	1	0	4	1	8	36
5	68	2	31	1	0	0	1	8	9	17	137
6	6	2	2	1	2	0	0	16	9	2	40
7	19	1	6	0	0	0	1	7	0	13	47
8	32	2	17	5	102	21	28	62	3	27	299
9	82	4	1	1	21	10	4	0	70	15	208
10	167	38	36	5	5	4	6	42	17	253	573
11	1342	129	269	36	137	40	47	299	208	573	3080

T A B L E D - 5

B SS 20 (2) - Total Matrix - First Four Periods - Procedural

	1	2	3	4	5	6	7	8	9	10	11
1	945	29	78	8	10	5	10	16	179	107	1387
2	25	4	5	0	2	1	0	19	11	18	85
3	16	11	14	0	0	0	1	72	0	31	145
4	6	0	0	3	0	0	0	4	2	4	19
5	57	4	17	0	2	1	1	3	13	14	112
6	18	1	0	0	0	1	1	5	16	4	46
7	19	2	1	0	0	1	1	1	2	5	32
8	18	6	12	1	67	9	12	59	5	17	206
9	163	5	0	1	25	26	2	1	117	38	378
10	120	23	18	6	6	2	4	26	33	180	418
11	1387	85	145	19	112	46	32	206	378	418	2828

T A B L E D - 6

B SS 10 - Total Matrix - First Four Periods - Procedural

	1	2	3	4	5	6	7	8	9	10	11
1	698	18	110	16	5	0	2	11	33	102	995
2	17	7	4	1	0	0	0	21	6	15	71
3	10	14	20	1	0	0	1	107	2	24	179
4	7	0	2	14	0	0	0	16	0	10	49
5	67	0	10	4	1	0	1	3	1	22	109
6	3	0	1	1	0	0	1	5	3	1	15
7	10	2	2	0	0	0	3	3	5	3	28
8	25	4	15	3	91	8	11	45	5	18	225
9	22	2	3	1	7	5	2	0	19	16	77
10	136	24	12	8	5	2	7	14	3	259	470
11	995	71	179	49	109	15	28	225	77	470	2218

T A B L E D - 7

R S S 30 (M) - Total Matrix - First Four Periods - Procedural

	1	2	3	4	5	6	7	8	9	10	11
1	1935	39	73	17	11	1	1	7	47	67	2198
2	15	9	8	0	0	0	1	60	20	32	145
3	12	45	25	0	1	0	1	57	2	24	167
4	4	7	0	6	0	0	0	7	0	5	29
5	71	5	23	2	0	0	0	7	4	8	120
6	4	1	0	0	1	0	0	10	6	1	23
7	9	7	3	0	1	0	3	1	4	4	32
8	23	5	16	1	84	12	16	70	0	7	234
9	46	4	1	0	19	10	7	0	116	6	209
10	79	23	18	3	3	0	3	15	10	51	205
11	2198	145	167	29	120	23	32	234	209	205	3362

T A B L E D - 8

R S S 30 (D) - Total Matrix - First Four Periods - Procedural

	1	2	3	4	5	6	7	8	9	10	11
1	843	21	27	28	12	0	2	4	24	56	1017
2	15	18	6	3	1	1	1	28	8	23	104
3	4	16	3	0	0	0	0	25	0	8	56
4	4	14	1	35	1	0	0	27	2	15	99
5	43	1	10	8	0	0	0	0	7	8	77
6	4	1	1	0	0	1	0	4	4	0	15
7	2	3	0	1	0	0	3	0	2	2	13
8	18	10	5	10	44	7	3	75	2	4	178
9	19	0	0	4	18	6	1	0	37	5	90
10	65	20	3	10	1	0	3	15	4	75	196
11	1017	104	56	99	77	15	13	178	90	196	1845

T A B L E D - 9  
R Soc - Total Matrix - First Four Periods - Procedural

	1	2	3	4	5	6	7	8	9	10	11
1	938	18	1	16	17	3	0	1	38	36	1068
2	8	15	0	2	1	2	0	12	27	14	81
3	0	1	0	0	0	0	0	3	0	0	4
4	6	10	0	26	0	0	0	14	4	7	67
5	35	7	0	8	12	1	0	5	17	6	91
6	7	4	0	0	0	1	0	1	8	7	28
7	1	0	0	0	0	0	0	0	0	0	1
8	5	2	1	2	19	3	1	80	5	1	119
9	29	9	1	7	40	14	0	1	221	13	335
10	39	15	1	6	2	4	0	2	15	30	114
11	1068	81	4	67	91	28	1	119	335	114	1908

T A B L E D - 10

A SS 30 - Total Matrix - First Four Periods - Force

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	1	4	0	0	1	1	0	1	0	1	0	1	10
2	0	19	7	0	0	0	1	4	4	2	1	0	5	43
3	4	7	213	0	3	9	6	3	1	0	2	0	5	253
4	0	0	1	2	0	0	0	0	1	0	0	0	0	4
5	0	0	2	1	19	1	0	1	0	0	0	0	0	24
6	0	1	7	0	1	33	1	2	0	1	0	0	1	47
7	1	2	1	1	0	0	10	0	4	0	2	1	5	27
8	0	1	5	0	0	1	0	7	0	0	2	0	1	17
9	3	2	2	0	0	1	3	0	8	3	0	0	0	22
10	0	0	0	0	0	1	2	0	1	4	1	1	0	10
11	2	0	2	0	1	0	1	0	2	0	10	1	0	19
12	0	0	2	0	0	0	1	0	0	0	0	2	0	5
13	0	10	7	0	0	0	1	0	0	0	0	0	5	23
14	10	43	253	4	24	47	27	17	22	10	19	5	23	504



T A B L E D - 11

A S S 20 - Total Matrix - First Four Periods - Force

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	7	3	5	2	1	8	0	0	1	0	0	1	1	29
2	2	17	8	3	0	0	4	3	5	2	0	5	16	65
3	2	7	150	9	0	6	9	0	0	1	1	0	10	195
4	4	2	13	11	0	3	2	0	0	0	0	0	3	38
5	0	2	0	1	13	2	0	0	0	0	2	0	0	20
6	0	1	1	7	4	79	5	1	1	0	0	0	2	101
7	0	6	4	0	0	1	4	0	9	0	0	1	13	38
8	0	1	2	2	0	0	0	2	0	0	1	0	0	8
9	8	4	3	0	0	0	3	1	7	0	0	1	0	27
10	0	1	2	0	0	0	1	0	0	0	0	0	0	4
11	0	0	0	0	2	1	0	0	0	0	2	1	0	6
12	5	2	0	0	0	0	3	0	0	0	0	7	0	17
13	1	19	7	3	0	1	7	1	4	1	0	1	19	64
14	29	65	195	38	20	101	38	8	27	4	6	17	64	612

T A B L E D - 12

A S S 10 - Total Matrix - First Four Periods - Force

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	10	8	0	0	0	6	7	1	0	0	0	1	34
2	1	59	18	0	0	0	5	11	20	0	0	0	5	119
3	4	25	137	0	0	2	8	14	1	0	0	0	3	194
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	2	0	0	3	0	0	0	0	0	0	0	5
7	0	7	5	0	0	0	3	1	6	0	0	0	1	23
8	9	5	16	0	0	0	0	7	0	0	0	0	5	42
9	18	5	3	0	0	0	1	0	13	0	0	0	2	42
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	1	8	5	0	0	0	0	2	1	0	0	0	7	24
14	34	119	194	0	0	5	23	42	42	0	0	0	24	483

T A B L E D - 13

B S S 20 (1) - Total Matrix - First Four Periods - Force

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	216	7	28	2	3	0	4	26	21	0	0	0	0	307
2	5	2	2	0	0	0	9	3	1	0	0	0	0	22
3	20	5	3	0	0	0	16	4	22	0	0	0	0	70
4	2	0	1	0	0	0	2	5	0	0	0	0	0	10
5	8	0	2	0	0	0	1	0	0	0	0	0	0	11
6	0	1	0	0	0	0	0	0	0	0	0	0	0	1
7	5	0	19	3	5	0	5	0	5	0	0	0	0	42
8	25	2	6	5	3	0	0	22	4	0	0	0	0	67
9	26	5	9	0	0	1	5	7	20	0	0	0	0	73
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	307	22	70	10	11	1	42	67	73	0	0	0	0	603

T A B L E D - 14

B SS 20 (2) - Total Matrix - First Three Periods - Force

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	2	21	0	0	2	5	4	4	2	0	0	6	47
2	0	8	16	1	0	1	5	13	4	2	0	0	10	60
3	3	11	150	18	0	10	23	49	17	4	0	5	32	322
4	0	2	12	10	0	5	0	4	2	0	0	0	5	40
5	0	0	1	0	2	0	0	0	1	0	0	0	0	4
6	0	0	6	4	0	100	5	12	3	1	1	2	5	139
7	0	2	9	0	0	3	5	3	30	0	0	1	6	59
8	1	8	57	4	1	11	0	18	2	0	2	6	10	120
9	36	5	13	0	1	1	4	1	22	2	0	0	13	98
10	0	2	3	1	0	1	0	1	1	0	0	1	2	12
11	0	0	0	0	0	0	1	2	0	0	1	0	0	4
12	2	0	10	0	0	1	1	2	0	0	0	19	0	35
13	4	20	24	2	0	4	10	11	12	1	0	1	38	127
14	47	60	322	40	4	139	59	120	98	12	4	35	127	1067

T A B L E D - 15  
B S S 10 - Total Matrix - First Four Periods - Force

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	0	9	0	0	7	6	0	0	0	0	0	7	29
2	0	5	4	0	0	0	3	1	3	0	0	0	6	22
3	0	2	150	1	1	13	27	2	4	0	0	0	40	240
4	0	0	1	5	0	0	0	1	0	0	0	0	1	8
5	0	0	0	0	13	1	2	0	0	0	1	0	1	18
6	0	2	7	0	0	82	17	0	2	0	0	0	6	116
7	0	2	5	0	3	4	6	0	39	1	4	5	11	80
8	0	0	3	0	0	1	0	2	1	0	0	0	1	8
9	24	4	6	1	0	2	6	0	7	0	0	0	8	58
10	0	0	0	0	0	0	0	0	0	1	0	0	1	2
11	3	0	0	0	0	0	3	0	0	0	4	1	0	11
12	1	1	0	0	0	4	0	0	0	0	0	3	0	9
13	1	6	55	1	1	2	10	2	2	0	2	0	107	189
14	29	22	240	8	18	116	80	8	58	2	11	9	189	790

T A B L E D - 16

R S S 30 (M) - Total Matrix - First Four Periods - Force

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	3	17	0	0	9	11	0	1	1	0	0	3	45
2	1	28	10	0	0	6	11	7	28	3	2	8	27	131
3	2	18	414	3	2	26	36	4	3	2	3	2	43	558
4	0	0	5	7	0	2	0	1	0	0	1	0	1	17
5	0	0	1	0	23	3	6	0	0	1	0	0	2	36
6	1	10	21	3	1	315	21	2	5	0	4	2	26	411
7	1	33	12	0	4	9	35	1	29	8	1	15	32	180
8	0	4	6	0	0	6	0	5	0	0	3	1	1	26
9	30	8	12	0	0	3	12	0	11	1	1	2	3	83
10	1	2	2	0	2	3	6	0	0	3	0	2	3	24
11	2	0	3	1	0	4	3	1	0	0	26	0	1	41
12	4	1	8	1	0	5	11	0	0	1	0	49	1	81
13	3	24	47	2	4	20	28	5	6	4	0	0	66	209
14	45	131	558	17	36	411	180	26	83	24	41	81	209	1842

T A B L E D - 17

R SS 30 (D) - Total Matrix - First Four Periods - Force

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	3	14	57	1	1	19	21	1	2	1	0	2	6	128
2	3	23	21	0	0	7	10	18	67	6	3	10	28	196
3	6	28	888	21	6	88	64	10	24	1	2	6	51	1195
4	1	1	24	30	0	8	1	2	1	0	0	0	2	70
5	0	4	4	2	38	2	2	0	1	0	0	0	0	53
6	0	14	82	6	2	620	22	6	6	1	0	1	13	773
7	0	50	18	2	2	2	31	1	55	0	2	9	17	189
8	1	8	24	4	0	3	4	21	1	0	5	4	2	77
9	91	20	23	2	1	2	18	5	40	2	1	5	1	211
10	4	2	0	0	0	1	1	0	2	4	0	2	0	16
11	2	1	1	2	1	1	2	3	0	0	30	2	0	45
12	15	5	3	0	1	2	6	5	1	0	2	49	3	92
13	2	26	50	0	1	18	7	5	11	1	0	2	49	172
14	128	196	1195	70	53	773	189	77	211	16	45	92	172	3217

T A B L E D - 18

R Soc - Total Matrix - First Four Periods - Force

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	1	7	2	0	6	0	0	1	0	0	0	1	19
2	0	34	23	6	0	8	10	2	12	8	6	7	16	132
3	3	24	272	13	1	21	4	4	10	1	0	2	25	380
4	2	2	16	19	2	4	2	0	0	0	1	0	2	50
5	0	0	1	0	14	2	0	0	0	0	1	0	2	20
6	3	8	20	4	0	156	12	3	3	2	2	6	5	224
7	2	8	1	1	1	7	23	2	5	3	2	4	13	72
8	2	4	1	0	0	1	1	4	1	3	1	1	1	20
9	3	8	12	0	0	3	2	1	17	0	1	1	5	53
10	0	10	2	0	0	3	2	0	1	29	5	8	2	62
11	1	5	2	0	1	1	3	0	0	5	23	8	1	50
12	1	6	1	1	0	7	4	2	0	9	8	54	1	94
13	1	22	22	4	1	5	9	2	3	2	0	3	28	102
14	19	132	380	50	20	224	72	20	53	62	50	94	102	1278



## **APPENDIX E**

### **INTERACTION ANALYSIS - ROTATED FACTOR MATRICES**

**E-1 Interaction Analysis-Quartimax Factor Pattern**

**E-2 Interaction Analysis-Equamax Factor Pattern**

# T A B L E - E - 1

## Interaction Analysis-Quartimax Factor Pattern\*

COMMUNITIES	1	2	3	4	5	6
1	826					
2			893			
3	460				702	
4		688				
5		-420			610	
6					851	
7	873					
8		788				
9	748					
10						742
11				632		908
12						
13						
14					641	
15			893			
16	915					
17				892		
18	698					
19	478	557		487		
20			563			
21	732					
22		729				491
23	847					
	17.847					

\* Only loadings greater than .418 are included and decimal points have been omitted.

T A B L E - E - 2

## Interaction Analysis-Equamax Factor Pattern\*

COMMUNITIES	1	2	3	4	5	6
1	850					
2	823				893	
3	815	789				
4	641		678			
5	743	553	-479			
6	870	883				
7	867					
8	710		804			
9	638					763
10	721					904
11	844			620		
12	620					
13	832					
14	751	713			892	
15	804					
16	889			885		
17	829					
18	784					
19	782					
20	451					
21	798					
22	930		599	542	568	
23	771		699	481		541
	17.847					

APPENDIX F

TOTALLED PERIOD MATRICES - FORCE -

19 CATEGORIES

## A P P E N D I X F

### Tables

- F - 1 - Teacher A - Totalled Force Matrix - 19 Categories
- F - 2 - Teacher A - Force - 19 Categories - Adjusted Base 1000
- F - 3 - Teacher B - Totalled Force Matrix - 19 Categories
- F - 4 - Teacher B - Force - 19 Categories - Adjusted Base 1000
- F - 5 - Teacher R - Totalled Force Matrix - 19 Categories
- F - 6 - Teacher R - Force - 19 Categories - Adjusted Base 1000

T A B L E - F - 1

Teacher A - Totalled Force Matrix - 19 Categories

Matrix	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	29	26	2	4	63	2	2	26	20	0	0	0	0	9	0	1	1	9	7	20
2	7	257	29	16	81	4	0	5	30	0	1	1	4	72	19	6	16	35	98	681
3	1	45	90	6	28	0	0	0	7	0	0	0	0	0	0	0	0	2	10	189
4	5	29	7	42	13	2	0	2	4	1	0	0	2	4	0	2	2	1	9	125
5	20	113	32	9	1197	35	6	65	104	2	0	2	1	11	2	3	1	23	54	1680
6	4	9	3	1	31	39	1	6	4	0	0	0	0	2	0	0	0	2	7	109
7	0	4	0	0	5	2	91	5	2	0	0	0	0	1	2	3	1	1	3	120
8	2	11	1	3	58	14	9	378	34	0	1	0	1	3	4	2	2	3	9	535
9	2	53	3	2	32	1	1	7	96	2	0	0	0	85	14	9	16	0	78	401
10	0	1	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	7
11	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	2	0	5
13	0	3	0	4	0	1	0	1	0	0	0	0	0	0	0	2	0	0	1	12
14	92	20	2	12	37	0	0	9	29	1	0	0	3	149	5	1	5	3	7	375
15	3	9	1	3	4	0	1	10	17	0	0	0	0	1	42	8	7	0	2	108
16	2	3	1	2	3	0	5	2	8	1	0	0	0	4	5	73	6	0	3	117
17	18	3	0	4	7	0	1	6	10	0	0	0	0	1	4	1	46	0	5	106
18	9	7	2	3	38	3	0	4	4	0	0	2	0	5	0	3	0	35	9	124
19	7	86	14	14	83	6	3	9	31	0	0	0	1	25	11	4	3	7	125	429
20	201	681	189	125	1679	110	120	535	401	7	2	5	12	375	108	118	106	124	428	5326

T A B L E - F - 2

Teacher A Force - 19 Categories - Adjusted Base 1000

Matrix	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1.27	7.61	0.63	0.63	14.59	0.00	0.00	0.63	4.44	0.00	0.00	0.00	0.00	1.90	0.00	0.00	0.00	4.44	0.63	36.80
2	1.27	72.34	5.71	0.63	20.94	1.27	0.00	1.27	5.08	0.00	0.00	0.63	1.90	20.30	0.00	0.00	0.63	13.96	14.59	160.53
3	0.00	9.52	14.59	0.00	4.44	0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	1.27	31.73
4	1.27	3.81	0.63	3.17	5.08	0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.63	1.27	0.00	0.00	0.63	0.63	1.27	19.67
5	2.54	31.09	3.81	2.54	248.10	6.35	0.00	10.79	19.04	1.27	0.00	1.27	0.00	1.90	0.00	0.00	0.00	13.32	8.25	350.25
6	0.00	3.17	0.63	0.00	5.71	12.69	0.00	1.90	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	0.63	26.65
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	1.27	0.00	1.90	8.88	3.17	0.00	43.78	1.27	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.63	61.55
9	0.00	8.88	0.63	0.63	5.08	0.00	0.00	0.00	12.69	1.27	0.00	0.00	0.00	17.77	3.81	0.63	1.27	0.00	6.35	59.01
10	0.00	0.00	1.27	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	2.54
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	1.27	0.00	0.00	0.00	1.27	0.00	3.17
13	0.00	1.27	0.00	1.27	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	3.81
14	20.94	5.71	0.00	3.81	7.61	0.00	0.00	0.00	7.61	0.00	0.00	0.00	0.63	58.38	0.00	0.00	0.63	1.27	2.54	109.14
15	1.27	0.00	0.00	0.63	0.00	0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.63	4.44
16	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
17	1.27	0.00	0.00	0.63	0.63	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	3.81
18	5.71	4.44	0.63	1.27	17.13	1.27	0.00	0.63	0.00	0.00	0.00	1.27	0.00	2.54	0.00	0.00	0.00	12.69	5.71	53.30
19	1.27	11.42	3.17	2.54	11.42	1.27	0.00	1.27	3.81	0.00	0.00	0.00	0.00	3.81	0.00	0.00	0.00	3.17	29.82	72.97
20	36.80	160.53	31.73	19.67	350.25	26.65	0.00	61.55	59.01	2.54	0.00	3.17	3.81	109.14	4.44	0.63	3.81	53.30	72.97	1000.00

T A B L E - F - 3

Teacher B - Totalled Force Matrix - 19 Categories

Matrix 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	905	47	140	23	92	9	26	53	0	0	85	0	147	2	2	3	6	45	1590
2	25	50	12	3	45	3	4	67	0	1	12	0	70	3	4	8	8	45	360
3	38	25	33	0	7	2	0	103	0	0	3	0	74	0	0	0	0	13	298
4	7	17	2	15	18	4	2	14	0	0	1	4	18	2	1	3	12	32	153
5	75	44	41	19	915	43	55	165	3	2	10	7	69	4	6	9	61	184	1715
6	7	10	4	3	35	66	8	17	0	1	9	1	8	2	5	0	5	17	198
7	18	1	4	0	3	1	24	11	0	0	0	0	12	0	1	0	0	1	78
8	1	8	2	1	29	9	435	62	1	0	1	2	13	3	4	4	19	29	624
9	33	15	17	8	148	23	32	146	1	0	2	3	223	2	8	29	6	102	825
10	0	1	0	0	1	1	0	0	0	0	0	0	1	0	0	0	1	1	6
11	0	1	0	0	2	0	0	1	0	0	0	0	0	0	0	0	1	2	7
12	82	5	1	1	22	10	4	1	0	0	69	0	14	0	0	0	0	0	209
13	0	0	0	1	4	0	2	3	0	0	0	1	2	0	0	1	1	9	24
14	351	56	36	29	49	6	5	12	80	0	17	0	327	2	1	5	1	61	1038
15	1	1	0	3	3	1	0	2	4	0	0	0	2	7	0	4	1	5	34
16	11	1	0	3	11	1	0	6	0	0	0	0	0	0	30	1	4	3	72
17	17	8	0	4	16	0	0	15	0	0	0	1	0	2	0	74	4	9	156
18	2	1	0	14	87	3	1	12	1	0	0	0	4	0	3	9	28	12	178
19	17	70	6	27	227	17	2	29	77	0	3	0	54	4	7	6	19	562	1132
20	1590	361	298	154	1714	199	78	624	825	6	7	209	24	33	72	156	177	1132	8697



T A B L E - F - 4

Teacher B - Force - 19 Categories - Adjusted Base 1000

Matrix	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0.70	2.10	0.00	1.75	16.78	1.75	0.00	2.80	7.34	0.00	0.00	0.00	0.00	4.19	0.70	0.35	0.70	2.10	8.39	49.63
2	0.35	6.99	0.35	0.70	10.84	0.70	0.00	1.05	4.54	0.00	0.35	0.00	0.00	5.59	0.35	0.00	2.10	2.80	8.04	44.74
3	0.00	0.35	0.70	0.00	1.40	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	3.50
4	0.00	1.05	0.00	3.50	3.84	1.05	0.00	0.70	1.75	0.00	0.00	0.00	0.00	3.15	0.70	0.00	0.70	4.19	8.04	28.66
5	2.10	10.14	2.10	4.19	157.29	12.58	0.35	8.74	18.53	1.05	0.35	0.35	1.75	11.88	1.40	1.40	2.10	20.27	24.82	281.37
6	0.35	1.05	0.35	0.70	10.14	18.87	0.00	2.10	0.35	0.00	0.35	0.00	0.00	1.40	0.70	1.75	0.00	1.75	3.84	43.69
7	0.00	0.00	0.00	0.00	0.70	0.35	2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	3.50
8	0.00	1.40	0.00	0.35	3.50	2.10	0.35	84.94	8.74	0.00	0.00	0.35	0.35	1.75	0.35	0.70	0.70	5.59	4.54	115.69
9	0.35	1.05	0.00	0.35	6.99	0.70	0.00	3.15	12.58	0.35	0.00	0.00	0.00	27.61	0.00	0.00	2.80	1.05	13.98	70.95
10	0.00	0.00	0.00	0.00	0.35	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.35	1.75
11	0.00	0.35	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.35	1.75
12	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70
13	0.00	0.00	0.00	0.00	1.05	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	1.05	2.80
14	36.70	3.15	0.00	5.94	6.99	0.35	0.35	1.75	3.50	0.00	0.00	0.00	0.00	18.53	0.70	0.00	0.35	0.35	11.18	89.83
15	0.35	0.00	0.00	1.05	1.05	0.35	0.00	0.35	0.35	0.00	0.00	0.00	0.00	0.35	1.75	0.00	0.70	0.35	1.40	8.04
16	0.70	0.35	0.00	0.35	2.10	0.35	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	5.59	0.00	1.05	0.00	10.84
17	3.50	2.10	0.00	1.05	3.50	0.00	0.00	0.35	1.05	0.00	0.00	0.00	0.00	0.00	0.35	0.00	15.03	1.40	1.05	29.36
18	0.35	0.35	0.00	4.54	27.96	1.05	0.35	3.84	0.35	0.35	0.00	0.00	0.00	1.05	0.00	0.07	3.15	9.09	3.50	56.62
19	4.19	14.33	0.00	4.19	26.21	2.80	0.00	5.24	11.18	0.00	0.70	0.00	0.70	13.63	1.05	0.35	1.05	5.59	65.36	156.59
20	49.63	44.74	3.50	28.66	281.37	43.69	3.50	115.69	70.95	1.75	1.75	0.70	2.80	89.83	8.04	10.84	29.36	56.62	156.59	1000.00

T A B L E - E - 5

Teacher R - Totalled Force Matrix - 19 Categories

Matrix	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	6	23	0	6	129	8	1	42	53	0	0	0	0	16	4	1	4	7	34	334
2	3	78	8	4	59	4	0	13	36	0	1	0	1	111	16	6	26	32	90	488
3	0	12	44	0	27	2	2	8	3	0	0	0	0	0	0	0	0	0	4	102
4	2	19	1	19	30	7	0	13	13	0	0	0	0	21	4	4	7	14	27	182
5	17	77	25	23	1939	72	8	152	154	6	2	1	6	71	8	9	16	71	188	2846
6	3	5	3	3	71	110	3	20	4	0	1	0	0	5	2	7	0	9	16	261
7	0	4	1	0	7	4	81	7	8	0	0	0	0	2	1	1	0	0	4	120
8	4	30	8	7	125	19	4	1334	80	0	1	1	2	19	4	8	11	25	56	1736
9	4	91	1	4	50	4	7	27	125	3	0	0	0	168	11	5	36	5	102	643
10	0	2	0	0	2	1	0	1	0	1	0	0	0	2	1	1	0	1	1	13
11	0	1	0	0	1	0	0	0	1	0	0	0	0	0	2	0	0	1	1	7
12	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
13	0	2	0	3	3	0	0	1	1	0	0	0	2	0	0	0	0	1	4	17
14	229	20	3	42	64	3	2	13	42	1	0	0	0	121	5	3	9	6	41	604
15	6	4	0	13	7	1	2	8	10	0	0	0	0	4	41	5	14	1	9	125
16	7	1	0	7	12	4	2	6	8	0	0	0	0	0	5	95	10	7	2	166
17	30	8	0	13	22	3	1	15	24	0	0	0	1	1	11	10	195	10	8	351
18	4	7	0	16	110	7	1	20	5	1	0	0	1	4	0	10	15	52	13	266
19	18	104	8	21	186	14	6	57	76	1	2	0	4	59	10	1	8	25	330	930
20	333	488	103	181	2845	262	119	1738	643	13	7	2	17	604	125	167	351	267	930	9195

T A B L E - E - 5

Teacher R - Totalled Force Matrix - 19 Categories

Matrix	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	6	23	0	6	129	8	1	42	53	0	0	0	0	16	4	1	4	7	34	334
2	3	78	8	4	59	4	0	13	36	0	1	0	1	111	16	6	26	32	90	488
3	0	12	44	0	27	2	2	8	3	0	0	0	0	0	0	0	0	0	4	102
4	2	19	1	19	30	7	0	13	13	0	0	0	0	21	4	4	7	14	27	182
5	17	77	26	23	1939	72	8	152	154	6	2	1	6	71	8	9	16	71	188	2846
6	3	5	3	3	71	110	3	20	4	0	1	0	0	5	2	7	0	9	16	261
7	0	4	1	0	7	4	81	7	8	0	0	0	0	2	1	1	0	0	4	120
8	4	30	8	7	125	19	4	1334	80	0	1	1	2	19	4	8	11	25	56	1736
9	4	91	1	4	50	4	7	27	125	3	0	0	0	168	11	5	36	5	102	643
10	0	2	0	0	2	1	0	1	0	1	0	0	0	2	1	1	0	1	1	13
11	0	1	0	0	1	0	0	0	1	0	0	0	0	0	2	0	0	1	1	7
12	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
13	0	2	0	3	3	0	0	1	1	0	0	0	2	0	0	0	0	1	4	17
14	229	20	3	42	64	3	2	13	42	1	0	0	0	121	5	3	9	6	41	604
15	6	4	0	13	7	1	2	8	10	0	0	0	0	4	41	5	14	1	9	125
16	7	1	0	7	12	4	2	6	8	0	0	0	0	0	5	95	10	7	2	166
17	30	8	0	13	22	3	1	15	24	0	0	0	1	1	11	10	195	10	8	351
18	4	7	0	16	110	7	1	20	5	1	0	0	1	4	0	10	15	52	13	265
19	18	104	8	21	186	14	6	57	76	1	2	0	4	59	10	1	8	25	330	930
20	333	488	103	181	2845	262	119	1738	643	13	7	2	17	604	125	167	351	267	930	9195