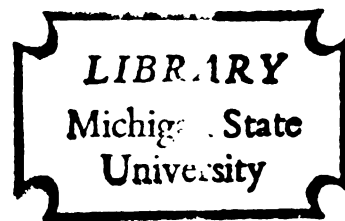


VERBAL-NONVERBAL INTERACTION
ANALYSIS:
EXPLORING A NEW METHODOLOGY
FOR QUANTIFYING DYADIC
COMMUNICATION SYSTEMS

Thesis for the Degree of Ph. D.
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ABSTRACT

VERBAL - NONVERBAL INTERACTION ANALYSIS: EXPLORING A NEW METHODOLOGY FOR QUANTIFYING DYADIC COMMUNICATION SYSTEMS

By

John Harold Frahm

This research focuses on a new methodology for quantifying verbal and nonverbal activity in dyadic communication. The methodology is called the Verbal-Nonverbal Interaction Analysis (VNVIA). One of its major assumptions is that the utilization of the verbal and nonverbal bands has communication import. The VNVIA quantifies verbal and nonverbal activity and creates a new technique for assessing the effectiveness of dyadic communication systems.

The content of the thesis can be grouped into three sections. The first describes the rationale for the methodology and presents the interaction content categories. The second presents some findings, establishing the reliability of the method. The third illustrates some ways the VNVIA can be utilized and suggests some future applications for the method.

The VNVIA codes the sequential states of a dyadic communication system. Each state can be analyzed in terms of the presence or absence of verbal and nonverbal activity. For instance, when one communicator in a dyad is talking and moving, and the other is silent and not moving, the interaction is in a state equivalent to one of the thirteen categories. There is one content category for each of the potential states of a dyadic communication system.

The sequence of coded states, sampled at an interval of three seconds, is used for constructing an interaction matrix. The interaction matrix can be compared with other interaction matrices to assess changes in communication activity as the result of manipulating the content and context of the interaction.

The reliability test confirms that inter-observer reliability is strong, that observers can code with accuracy after a minimal amount of training time, that observer fatigue is negligible after three hours of coding, and that observers coding the same interaction at two different times produce similar results. One other finding indicates that a three-second interval sample produces an interaction matrix equivalent to one produced by a sampling interval of one second.

John Harold Frahm

A limited application of the VNVIA to a group of simulated doctor-patient interactions indicates its utility for sorting out some characteristics of "successful" and "unsuccessful" interactions.

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By

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CHAPTER I

INTRODUCTION

The focus of this thesis is a new methodology for quantifying one dimension of the human interaction process. The methodology is called the Verbal-Nonverbal Interaction Analysis (VNVIA). The dimension which it quantifies is verbal and nonverbal communication activity. Designed especially for use in dyadic communication situations, VNVIA objectively generates data about the process of human interaction, taking into consideration the assumption that the verbal and nonverbal bands are not always redundant and that the selection of bands made by interactants may have communication significance.

In essence, it is a type of systems analysis focusing on the verbal and nonverbal activity occurring in dyadic communication. The analysis, to be discussed in detail in Chapter III, samples, at a standard time interval, the state of the communication system in terms of the occurrence of verbal and nonverbal activity. The analysis, which can be applied to interactions of any length, when

complete, yields a profile of communication band utilization during the interaction. The data produced by the interaction can be analyzed by various statistical methods.

VNVIA has at least three characteristics:

First, VNVIA assumes that the two communication bands, although of equal importance, often serve different functions. As a result the communication bands are treated independently. At the same time, since the interpretation of verbal and nonverbal bands may be important in the interaction flow, VNVIA codes the joint verbal-nonverbal activity.

Secondly, VNVIA is, in one sense, "content-free." Rather than describing the interaction in terms of its verbal and nonverbal message content, it describes the interaction in terms of the combinations of verbal and nonverbal activity. In brief, its focus is on the type and duration of the communication activity generated by each person in the dyad.

Thirdly, VNVIA is "objective." The observers who use VNVIA to code interactions are not required to interpret the verbal or nonverbal content. The coder's task is to record, at an interval of three seconds, the presence or absence of verbal and nonverbal activity.

This thesis is divided into seven chapters. Chapter I is a general statement of introduction. Chapter II outlines the problem which led to the development of the VNVIA, and it reviews some of the key interaction analysis methodologies. The summary of the literature provides a framework for viewing interaction analysis and indicates the place of VNVIA among other interaction analyses.

Chapter III describes the VNVIA methodology. In particular, it distinguishes between the interaction profile and interaction matrix, and outlines the indices or variables generated by the analysis.

Chapter IV discusses problems associated with testing the reliability of the VNVIA, and introduces some evidence for the reliability of the methodology. Chapter V describes a Markov-Chain chi square analysis, specifically developed to statistically test differences between interaction matrices.

Chapter VI reports some preliminary findings based on an initial application of the methodology. Chapter VII suggests some directions for future research and indicates some ways the methodology might be improved to answer a more extended range of communication questions.

The goal of this thesis is to explore the feasibility of the VNVIA as a research tool for generating meaningful data about verbal-nonverbal communication behavior. Introduction of a new

methodology usually raises questions about its reliability, validity and fruitfulness. The central focus of this thesis is to provide some evidence for its reliability.

The thesis will attempt to answer questions in two areas. The first is concerned with whether observers can generate similar interaction matrices when coding the same interview. The second is concerned with the feasibility of using a sampling interval for generating interaction data.

The questions which apply to the first area are:

1. Do several observers using the VNVIA generate essentially the same result when coding the same interview?
2. How much training is needed before observers generate reliable interaction maps?
3. Does the factor of fatigue create a significant change in the number of observer disagreements?
4. Do several observers, resolving disagreements, generate substantially the same result, when coding the same interaction at two different times?

The questions which apply to the second area are of two types. One relates to the utilization of different coding techniques. Interval coding requires that observers perceive the interaction with ear or eye and record their perceptions on a piece of paper. Continuous coding requires that observers perceive the interaction with ear or eye and record their perceptions mechanically by pressing a

button which activates a stylus on an event recorder. Here the question is:

1. Does continuous coding produce the same results as interval coding?

The other type of question which is part of the second area of concern relates to the comparison between coarse grain and fine grain sampling. In coarse grain sampling, the sampling interval is three seconds. In fine grain sampling, the sampling interval is one second. The question relating to interval size is:

2. Does the employment of coarse grain sampling lead to a different interaction map than the employment of fine grain sampling when the interaction is the same?

One question directly related to the interval size concerns the spot in the interaction where the sampling technique is initiated. Here the question is:

3. Is the sample initiated at interval T the same as the sample initiated at interval T plus 1?

The question of validity is less central and not vigorously treated in the thesis. Since the initial concern with the VNVIA is describing human behavior quantitatively, the concept of face validity is most appropriate. When the VNVIA is used as a measuring instrument where questions of inference are involved, the problem of validity becomes more complex. Because the methodology has such a broad range of application in theory testing, it is

difficult to make meaningful statements about its validity outside the theoretical contexts in which it could be utilized. However, Chapter VI reports some preliminary findings of its validity relative to one measure of interaction success.

The VNVIA is the first methodology of its type. Hopefully, by determining its reliability and exploring its implication for quantifying human behavior, the VNVIA can be a meaningful tool for systematically studying the communication process.

CHAPTER II

RATIONALE

It is unnecessary to dwell on the fact that communication research is undertaken to specify the factors contributing to successful human interaction. An early concern for understanding human communication led behavioral scientists to dwell on factors originating with the individual, who is the single component in most communication systems. The research results during this period proved fruitful, and the early methods for investigating communication behavior continue in wide use today (Scheflen, 1966).

Currently, new approaches for investigating human communication are being developed. Observational methods, interaction analysis in particular, are expanding the communication focus from a concern with the individual to a concern with the communication system. Today, the emphasis in communication research seems to be moving away from the study of individual variables and toward the study of system variables (Weick, 1968).

VNVIA was developed to investigate some new variables associated with interpersonal dyadic communication systems. The methodology generates specific information which leads to an evaluation of interaction success.

VNVIA is designed to quantify aspects of interpersonal dyadic interaction. This means that the communication system under investigation must be composed of two individuals engaged in a face-to-face information exchange.

Two people exchanging information have at their disposal two channels or communication bands: the verbal and nonverbal. Any methodology which does not consider both communication bands does not study all elements in the communication process. For some time, one of these bands, the nonverbal, was neglected. This situation was created because few people believed nonverbal communication played an important role in the transmission of information. A contributing factor was the lack of adequate tools for quantifying nonverbal content. The picture has changed, and the importance of nonverbal communication is no longer questioned. This fact is attested to by a recent review of studies in nonverbal communication by Duncan (1969).

In his conclusion, Duncan writes

It may be expected that nonverbal elements of communication, along with those of language, will provide powerful tools for investigating a variety of issues relating to the dynamics of human interaction and, ultimately, for testing competing communication models. (p. 133)

If the focus of investigation is dyadic interpersonal communication systems, and if we acknowledge that more than one channel of communication is available for individuals in that interaction, any methodology for investigating dyadic communication must consider the following assumptions: First, two communication bands are available and of potentially equal importance. Second, each band can and, in many cases, does serve a separate function. Third, there exists the possibility of an interrelationship not only between the two communicators, but also between the two communication bands.

RATIONALE

The rationale for developing the VNVIA is predicated on the three assumptions mentioned above. The paragraphs which follow discuss in some detail each of the three assumptions.

Two Communication Bands

Human beings seem to rely heavily on verbal communication. In scientific investigations of the way man exchanges ideas, the verbal band was the prime focus of attention. However, as the study of communication mushroomed, behavioral scientists from

many diverse academic areas became aware of the importance of nonverbal elements in the exchange of ideas and information.

Anthropologist Ray Birdwhistell (1961) estimated that in normal dyadic interaction, 65% of the situations' social meaning is transmitted via the nonverbal band.

Sociologist Erving Goffman (1959) likened the nonverbal behavior of individuals to a theatrical performance and suggested ways in which individuals purposefully manipulate their surroundings, dress, and behavior in an attempt to communicate. ✓

The nonverbal band has also been the focus of psychologists. Jurgen Ruesch (1966) indicates that disturbances in sign behavior, language, and communication are intimately associated with mental illness. He further postulates that the more severe and often longer lasting mental conditions are associated with disturbances in non-verbal sign behavior.

By understanding nonverbal codes, more effective methods of psychotherapy can be perfected. Paul Ekman (1957), Albert Schefflen (1966) and Birdwhistell (1952) have spent much time attempting to crack nonverbal performance codes.

Some behavioral scientists (Bales, 1950; Amidon and Flanders, 1967) believed that the verbal and nonverbal codes are redundant. Today, the research evidence clearly indicates that verbal-nonverbal redundancy is only one of the

relationships which exist between the two bands. Ruesch and Kees (1956), Ekman (1957), Watzlawick, Beavin and Jackson (1967), and others indicate that the verbal and nonverbal bands are at once dependent and independent. They are dependent in that nonverbal behavior often supports or regulates the flow of verbal communication. They are independent when, as in the "double bind," totally different messages are being sent in both bands, or when a particular band is inadequate for the communication of a particular type of message. These findings suggest that for many communication questions it may be important to consider the nonverbal band as well as the verbal.

VNVIA is a methodology for generating information about both communication bands. It treats the bands as being of equal importance, and provides for their analysis separately or together.

Functional Differences Between the Two Bands

Any methodology for investigating the verbal and nonverbal communication bands must account for the ways in which they differ.

First, each band operates differently. Verbal communication is one-way and alternating. That means usually one person is transmitting a message while the other(s) is (are) receiving. The exception occurs during those moments of verbal interruption or when

two individuals, in the heat of an argument, attempt to outtalk each other. Nonverbal communication is two-way and continuous. Individuals in dyadic interpersonal communication are constantly sending and receiving nonverbal messages apart from and often supplementary to the ongoing verbal utterance.

A second difference concerns the type of information carried in each channel. Ruesch and Kees (1956) differentiate between two types of language codes. One type, the verbal codes, they call digital. The other, referring primarily to nonverbal codes, they call analogic. Watzlawick, Beavin and Jackson (1967), who acknowledge the Ruesch and Kees dichotomy, argue that statements of relationship between individuals most often take the form of analogic codes. In human beings, expressions of affection more often tend to be communicated in the nonverbal band rather than the verbal.

It seems important that any verbal-nonverbal analysis be sensitive to the fact that the two communication bands serve different functions. A methodology to be adequate must code both the alternating interaction pattern in the verbal band as well as the continuous interaction occurring in the nonverbal band.

Because the message content transmitted in each band can be different, the methodology must focus on interaction characteristics which are, in a sense, content free. "In a sense" refers

primarily to message content. It is conceivable that extralinguistic aspects of an interaction could have content or possess meaning.

For example, by talking too much, or becoming nonverbally inactive, a person is transmitting important information, information which is often more important than that transmitted as part of the verbal message.

VNVIA satisfies the needs for a verbal-nonverbal analysis described above. By treating each communication band separately, it is able to account for the alternating and continuous nature of the verbal and nonverbal bands respectively. Since it primarily codes verbal and nonverbal activity, it is not concerned with message content. It clearly quantifies extralinguistic content, however.

Communication Band Interaction

It is obvious from the discussion above that human beings can and do utilize more than one communication band at a time, and that each band carries information distinctive to it. The contention in this section is that the joint utilization of communication bands creates an effect which is greater than when the two are considered separately. It is possible to visualize and study the structure or syntax of the communication flow in the verbal band as well as the nonverbal band. However, the structure or syntax of the two bands

interacting together must also be investigated. Such information will provide insights into how individuals utilize the two bands in conjunction with one another. In essence, an interaction methodology, to be complete, must quantify not only the behavior between two interacting individuals, but must also quantify the interaction of the two communication bands.

The VNVIA can account for the interrelationship between the verbal and nonverbal band. This is possible because the VNVIA categories account for all possible combinations of verbal and non-verbal activity in an interaction between two people, and because the state of the communication system is placed in one of those categories at a fixed interval of time.

In summarizing the qualities of VNVIA, it can be said that it considers both verbal and nonverbal communication bands as equally important, accounts for the fact that the two bands do not operate in the same way, is concerned with extralinguistic content and not verbal content, and quantifies the interaction of the individuals in the dyad as well as the interrelationship of the two communication bands.

The VNVIA belongs to a group of methodologies which can best be described as interaction analyses. Interaction analyses are methodologies which attempt to quantify or describe social interactions. Dyck (1963) indicates that social interaction occurs

. . . when an action (verbal or nonverbal) by one person is in some way responded to by another person, when each person is aware of the other and of the action in question, and when the action responded to is directed to or is about the person who is responding. (p. 80)

Interaction analyses are of two basic types. One is concerned with coding the number of interactional units commonly called the interact. The other is concerned with coding sequential states of the system.

CODING UNITS

There exist two prominent coding units: the interact and the double interact. An interact consists of some action and an immediate reaction. In this instance the observational unit would code who was communicating, what he was communicating (usually defined in terms of intent), who was receiving, and the way the designated receiver responded to the message of the initiator.

The double interact expands the interact observational unit one step. A double interact consists of an action of initiation, a response, and a subsequent act. In this case the observational unit would code who communicated what to whom with what effect, which in turn elicited a new response in the initiator.

The most common type of coding unit is the interact. The initial two interactional methods described in the following paragraphs are

examples of analyses employing the interact. They are the Bales Interaction Process Analysis (IPA) and Schefflen's Context Analysis.

Bales -- Interaction Process Analysis

Bales (1950) was mainly interested in studying problem solving groups. His IPA was specifically designed to quantify or categorize information flow within groups.

IPA quantifies two types of information. First, it identifies the source of the message and the receiver(s) at whom the message is directed. Secondly, it identifies the nature of the message. Bales does not formally include the response of the receivers as part of his interaction unit but that information is available to the user of the IPA.

When employed, the IPA system yields several types of information. It is possible to determine which pairs of individuals, of all possible pairs in the small group, interacted most often; which one individual within the group initiated the most messages; and which individual interacted with the largest number of persons in the group. Relative to message content, it is possible to learn the type of message most frequently employed throughout the entire interaction or at various stages in the interaction. It is also possible to trace the flow of the interaction over time, and learn whether certain

individuals are most active during different periods in the interaction's development.

Scheflen -- Context Analysis

There is some question as to whether Scheflen (1965; 1966) and his approach should be included as part of a review of major interaction methodologies. Of the analyses discussed in this chapter, it is the only one that does not code each interact as the interactional system evolves.

Scheflen is concerned with the problem of isolating the meaning(s) of nonverbal cues in interpersonal interaction. He contends that communication is an organization of abstractable structural units, standard in their nature, and shared by members of a common culture. A child born into the culture must learn the units and the way they are arranged if he wishes to communicate. The rationale for Context Analysis suggests that a nonverbal behavioral unit, eye rubbing, for example, can elicit a meaning or range of meanings just like the word "ball." To know any of the meanings, the context in which the word or nonverbal behavior is used must be considered.

Scheflen utilizes the interact to discover the meaning of nonverbal cues. When he is aware that a behavior such as eye rubbing has communication value, he studies it in the context of the

interact. He identifies the initiator of the behavior, the receiver and the reaction of the receiver. In performing his analysis, Scheflen searches for and identifies only those interacts in which a given specified behavior occurs. If the behavior in the majority of cases elicits the same response, the meaning for that nonverbal cue is secured.

Context Analysis is able to generate a series of meanings for a number of nonverbal behaviors in a specific individual's repertoire. Later, it is hoped that studies can be made across individuals, postulating that certain nonverbal behaviors are standard and used throughout a particular cultural group, taking into consideration individual variation in the use of the gesture.

Briefly then, one type of interaction analysis is concerned with coding units of interaction called interacts. The other type of interaction analysis is concerned with coding the succeeding states of an interaction as it evolves over time.

SYSTEM STATES

There are two prominent approaches to the quantification of system states. One approach is continuous coding in which the states of the evolving interaction are recorded at every point in time. The other is the sampling interval; that is, observers code at regular intervals the succeeding states of the interactional system.

An interaction analysis which employs the method of continuous coding is the Chapple Interaction Chronograph. Two analyses which employ the internal sampling method are the Flanders Interaction Analysis, and the method to be explored in this thesis, the Verbal-Nonverbal Interaction Analysis.

Chapple --Interaction Chronograph

Chapple (1949), confronted with the problem of developing a technique for objectively measuring and describing personality, turned to a time analysis of individuals in dyadic interaction. Concerned about the lack of objectivity in the content analytic models which stressed the classification of message content, Chapple constructed a methodology which puts the emphasis less on what the individual says and more on how he acts while saying it. His rationale suggests that evaluations of personality can be assessed by observing the time relations in the interaction patterns of people.

Chapple's instrument, the Interaction Chronograph, measures how long an individual speaks without a break, remains silent, starts to speak and then falls back into silence, or interrupts the other interactant in the dyad. He can determine the length of time each individual talks or how long both are mutually silent or talking. By measuring these interaction traits, Chapple is able to

assess the personality of the individuals communicating with each other.

The method of continuous coding, achieved by observers who react to the ongoing interaction by pressing a key which activates a stylus marking a moving tape, is essential for precise recordings of time.

Recently two similar instruments have been developed to quantify the temporal dimension in human interaction. One is the Interaction Recorder (Matarazzo, Wiens and Saslow, 1965). Unlike the Interaction Chronograph, its tape is computer compatible. This improvement provides for a faster, more accurate compilation of coder-generated data. The Automatic Vocal Transaction Analyzer (AVTA), developed by Cassota, Jaffe, Feldstein and Moses (1964), improves upon both the Interaction Chronograph and Interaction Recorder by eliminating the observer. AVTA is a totally noninferential system. The voice of each participant in the interaction is electronically separated and confined to one channel of a twin track audio tape. The data generated by AVTA, like the Interaction Recorder, can be computer processed.

The alternative to a continuous coding system is a method of interval sampling.

Flanders - Interaction Analysis

Amidon and Flanders (1967), concerned with interaction problems between teachers and students in the classroom, developed a methodology called Interaction Analysis. The instrument, reminiscent of the Bales IPA, allows teachers to quantify their verbal behavior in the classroom. The categories in the analysis are designed to point out whether a teacher tends toward direct or indirect methods of information dissemination.

While the category system resembles that of IPA, it is employed very differently. Rather than focusing on an observational unit like the interact, the state of the communication system is assigned to one of thirteen categories at a fixed time interval. The standard time interval suggested by Flanders is three seconds. The data generated by the Interaction Analysis provides information about the length of time a teacher or student remains in one system, e.g., lecturing to students or asking questions of a teacher. The method also provides information about the frequency with which the interaction moves from one system state (category) to any other and provides information about how the pattern of interaction changes as the system evolves.

Following an analysis of his classroom interaction pattern, a teacher might, for example, work toward changing teaching behavior

by lecturing less, allowing his students to participate more; or he might offer increased increments of reinforcing behavior.

The data produced by the Interaction Analysis are displayed in the form of a 13×13 matrix. Such a display has many advantages. First, it serves as a map of the entire interaction. Second, it graphically describes the type of verbal communication which has occurred and indicates which of the two communicants was most verbally active. Third, because the matrix is easy to generate, observers can provide a classroom teacher with an instant profile of his interaction behavior. This advantage stimulates many exciting possibilities. Instantaneously, teachers can receive feedback concerning their interaction performance and can move to rectify problems such as prolonged lecturing or the communication of information indicative of an overdirective approach, now widely acknowledged by most educators as being detrimental to learning.

There has been some concern about the selection of appropriate interaction categories. The result has been the development of two similar methodologies. One is the Verbal Interaction Category System (VICS) developed by Amidon and Hunter (1967). The other, the Observational System for Instructional Analysis, was developed by Hough (1967).

One purpose of this review is to demonstrate the position of VNVIA in relation to other types of interaction analysis. In the discussion of VNVIA to follow in the next chapter, it will be clear that VNVIA most definitely belongs to the category represented by the Flanders Interaction Analysis. While it is like the Flanders Interaction Analysis in that it does not specifically code the interact and is based on a standard sampling interval, it does differ because it does not treat message content and is concerned with both verbal and nonverbal bands.¹

Finally, before the more detailed consideration of VNVIA, it should be helpful to explain further how the interaction analyses described earlier are concerned with verbal or nonverbal communication.

METHODS FOR QUANTIFYING HUMAN INTERACTION

Interaction analyses can essentially be placed into one of three areas of concern: nonverbal, verbal, and extralinguistic. Extralinguistic is a term employed by Weick (1968) and refers to

¹Recently, Peggy Amidon has proposed a coding technique which would extend the Flanders technique to the nonverbal band. Amidon, Peggy. Nonverbal interaction analysis. Paper read at American Educational Research Association Convention, Minneapolis, 1970.

those aspects of verbal and nonverbal codes which are not directly concerned with language. For example, the amount of nonverbal behavior, the length of verbal utterances and the quality of one's voice or handwriting would be considered extralinguistic.

Nonverbal

One of the few nonverbal interaction analyses is Schefflen's Context Analysis. This is perhaps a function of the recency with which behavioral scientists have acknowledged the importance of nonverbal communication. The number of methodologies of a non-interaction type within the nonverbal area is growing rapidly. This fact is borne out in the recent review of nonverbal communication by Duncan (1969). Two nonverbal methodologies should be mentioned because of their unique and important contribution in understanding nonverbal performance codes, Kinesics, developed by Birdwhistell (1952), and Systematic Classification and Analysis of Nonverbal Behavior (SCAN), created by Ekman, Friesen, and Taussig (1969).

Verbal

Two of the interaction analyses discussed above can be placed in the verbal category. These would be Bales' IPA and

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Flanders' Interaction Analysis. Both these analyses attempt to quantify human interaction on the basis of message content. The information provided by verbal interaction analyses allows the user to manipulate his message content for the purpose of controlling communication systems.

Extralinguistic

The Chapple Interaction Chronograph falls clearly within the extralinguistic category. The dimension of communication which it quantifies is verbal activity. Extralinguistic interaction analysis provides indices which can be utilized to determine the success or failure of human interaction.

The VNVIA, under investigation in this thesis, is an extralinguistic interaction analysis. It is a more complete analysis than the Interaction Chronograph since it considers both the verbal and nonverbal communication bands. Like the Interaction Chronograph, VNVIA can provide its user with indices indicative of interaction success or failure.

If, as this thesis hopes to demonstrate, VNVIA is a reliable and fruitful method for quantifying human interaction, the potential for investigating research questions in dyadic communication will increase.

CHAPTER III

METHODOLOGY

An individual engaged in the process of dyadic communication makes several kinds of decisions. One decision concerns message content. Deciding what to say is perhaps the major communication decision in which an individual engages. Another decision, one directly related to the methodology explored in this thesis, concerns the selection of a communication band or combination of bands to transmit that content. For example, if a communicator wishes to interrupt a communication and inject a thought or message into the flow of the interaction, he may choose the verbal channel, and with a loud oral probe arrest the attention of the other person in the dyad; or he may achieve the same effect through the nonverbal channel by engaging in a series of broad gestures, head nods, facial expressions or posture shifts.

The fact that an individual possesses this freedom of choice accounts for some of the variability in the amount of ongoing communication activity in the verbal and nonverbal bands. A measure

of this variability can be an important index for analyzing communication behavior. Indices related to the utilization of communication bands can allow for the construction of dyadic interaction typologies. These typologies can be of value in making predictions about verbal and nonverbal communication band utilization and of interaction success or failure.

The Verbal-Nonverbal Interaction Analysis (VNVIA) was designed specifically to code activity in the verbal and nonverbal bands for each of the two communicators in a video taped dyadic interaction. To apply VNVIA, an interaction must be viewed as being composed of a sequence of states. These states are defined in terms of communication band utilization by the two interacting individuals. For example, if at some point in time during an interaction, one individual is talking and engaging in nonverbal behavior while the other is verbally and nonverbally silent, the system would be described as being in X state. If after several seconds, individual two, still verbally silent, now begins to gesture slightly, the system has moved into a new state, Y.

The category system described in the following paragraphs specifies the range of possible states in which a communication system can be.

THE CATEGORY SYSTEM

In order to code the states of the system, 16 categories have been constructed, exhausting all the possible combinations of verbal and nonverbal activity produced by the interactants. In actuality, these 16 possible categories are reduced to 13 by collapsing, into one, the four states in which both communicators are using the verbal band simultaneously. The code system is shown in Figure 3-1 on the following page.

An analysis of the categories shows that numbers 1-4 pertain to the verbalization of communicator one with the various possible uses of the two nonverbal bands.

Numbers 5-8 pertain to the verbalization of communicator two. Numbers 9-12 include various combinations of nonverbal interaction, with number 12 being total silence and inaction. Number 13 pertains to all the situations where both communicators are talking simultaneously.

Categories 1 and 2 show that communicator one is talking in the absence of a nonverbal response from communicator two. Categories 5 and 6 show that communicator two is talking in the absence of a nonverbal response from communicator one.

Figure 3-1

The VNVIA Categories and Their Meanings:
 + Indicates Activity; 0 Indicates Inactivity

Category	C ₁		C ₂		Description
	V	NV	V	NV	
1	+	0	0	0	C ₁ (doctor) ^a talking, not moving; C ₂ (patient) silent, not moving
2	+	+	0	0	Doctor talking, moving; patient silent, not moving
3	+	0	0	+	Doctor talking, not moving; patient silent, moving
4	+	+	0	+	Doctor talking, moving; patient silent, moving
5	0	0	+	0	Doctor silent, not moving; patient talking, not moving
6	0	0	+	+	Doctor silent, not moving; patient talking, moving
7	0	+	+	0	Doctor silent, moving; patient talking, not moving
8	0	+	+	+	Doctor silent, moving; patient talking, moving
9	0	+	0	0	Doctor silent, moving; patient silent, not moving
10	0	0	0	+	Doctor silent, not moving; patient silent, moving
11	0	+	0	+	Doctor silent, moving; patient silent, moving
12	0	0	0	0	Silence, no movement for both doctor and patient
13	+	x	+	x	Both doctor and patient talking

VNVIA utilizes 13 categories to code "states" of the communication system in terms of the activity or inactivity in the verbal and nonverbal bands. C₁ and C₂ correspond to communicator one and communicator two. V and NV are the abbreviations for the verbal and nonverbal communication bands.

^aDoctor and patient are used in place of C₁ and C₂ because in the present study the VNVIA was applied to interactions between doctors and patients.

In categories 2, 4, 6, and 8, the communicator is performing nonverbal action while speaking. In categories 1, 3, 5, and 7, the communicator is nonverbally inactive.

Each of the categories suggests a different state, with all categories exhausting the range of activity and inactivity which can occur in dyadic interaction.

While each of these categories is content free, each, in its way, describes the relationship and tenor of the ongoing communication. An interaction situation coded into category 1, where the doctor is talking and not moving and where the patient is silent, may suggest an entirely different mood and doctor-patient interrelationship than the situation coded in category 2, where the doctor became animated while speaking, or a situation coded in category 4, where the patient now joins the doctor in nonverbal activity by possibly nodding in agreement or demonstrating signs of aggravation.

Considering a series of interaction situations over time, the influence of certain situations or states on succeeding states should become apparent.

CODING

There are essentially two methods which can be employed in the coding of an interaction using VNVIA. One is a continuous

method similar to the one employed by Chapple (1949), where observers, utilizing some type of event recorder, code the presence or absence of verbal and nonverbal activity continuously. The other is a sampling method, developed and utilized by Amidon and Flanders (1967), in which some fixed interval determines the points to be sampled.

Initially, it was felt that observers should be able to code the activity occurring in the interactants' verbal and nonverbal bands without much difficulty. However, early experimentation with the method demonstrated that, at least initially, coders can accurately judge the activity occurring only in one band for one interactant. This meant that a method had to be devised which allowed the researcher to combine the four separate judgments of the interaction into one, thereby providing for the proper application of the category scheme.

Since it was mandatory that the four separate judgments be synchronized, a 600 Hz square wave was introduced into the audio track of the video tape. For continuous recording, only one such tone is necessary, at the start of the interaction. For the sampling method, the tone has to be repeated at a fixed interval throughout the entire interaction.

The sampling method provides the easiest and most economical way of securing data from an interaction. However, this presents the problem of selecting a sampling interval.

With a sampling interval exceeding five seconds, there is some concern about generalizing from the data to situations as they exist. It would be naive to assume that during every five-second interval the communication system did not proceed through a number of state changes. The problem is partially eliminated by reducing the interval to three seconds. However, again there is little assurance, especially regarding nonverbal band utilization, that state changes would not occur during the three-second interval. The problem of moving below a three-second interval is increased because observers are unlikely to be able to make accurate judgments less than three seconds apart.

It was decided to tentatively adopt the three-second interval and compare it against some continuous recording. One section of the thesis is concerned with investigating the feasibility of the three-second interval.

When the coding is performed at the fixed interval, observers (usually three or more in number) indicate, for a particular interactant, and for a particular band, whether there is activity occurring when the 600 Hz tone is heard. In a five-minute interaction, an

observer will make exactly 100 judgments three seconds apart. When the prearranged segment of an interaction has been coded, observers, each of whom has been making judgments of the same band and same interactant, compare their results. When disagreements occur the observers indicate the points of disagreement and identify the tone at which the disagreement occurred. When the tape is played back, observers give special attention to those points in question. Usually the tape is stopped at that point and observers make their judgment unanimous.

The process is repeated until each band for each interactant has been recorded, and the intercoder disagreements resolved. By placing the four single-band codings together, the data can be assigned into the 1-through-13 category system.

When the coding is complete, the researcher has a series of numbers which characterize the succeeding states of the communication system at regular intervals. This chain of numbers then becomes the data from which the interaction matrix is generated.

With the continuous coding, a similar procedure is followed. However, instead of making one judgment every three seconds, coders record their observations of activity and inactivity continuously by pressing a button which activates a stylus on an event recorder. Like the coding at three-second intervals, observers code one band

of one interactant at a time. The event recorder data are treated similarly to that recorded by the interval method. However, with a continuous record, the sampling interval can extend from a fraction of a second up to five seconds or more.

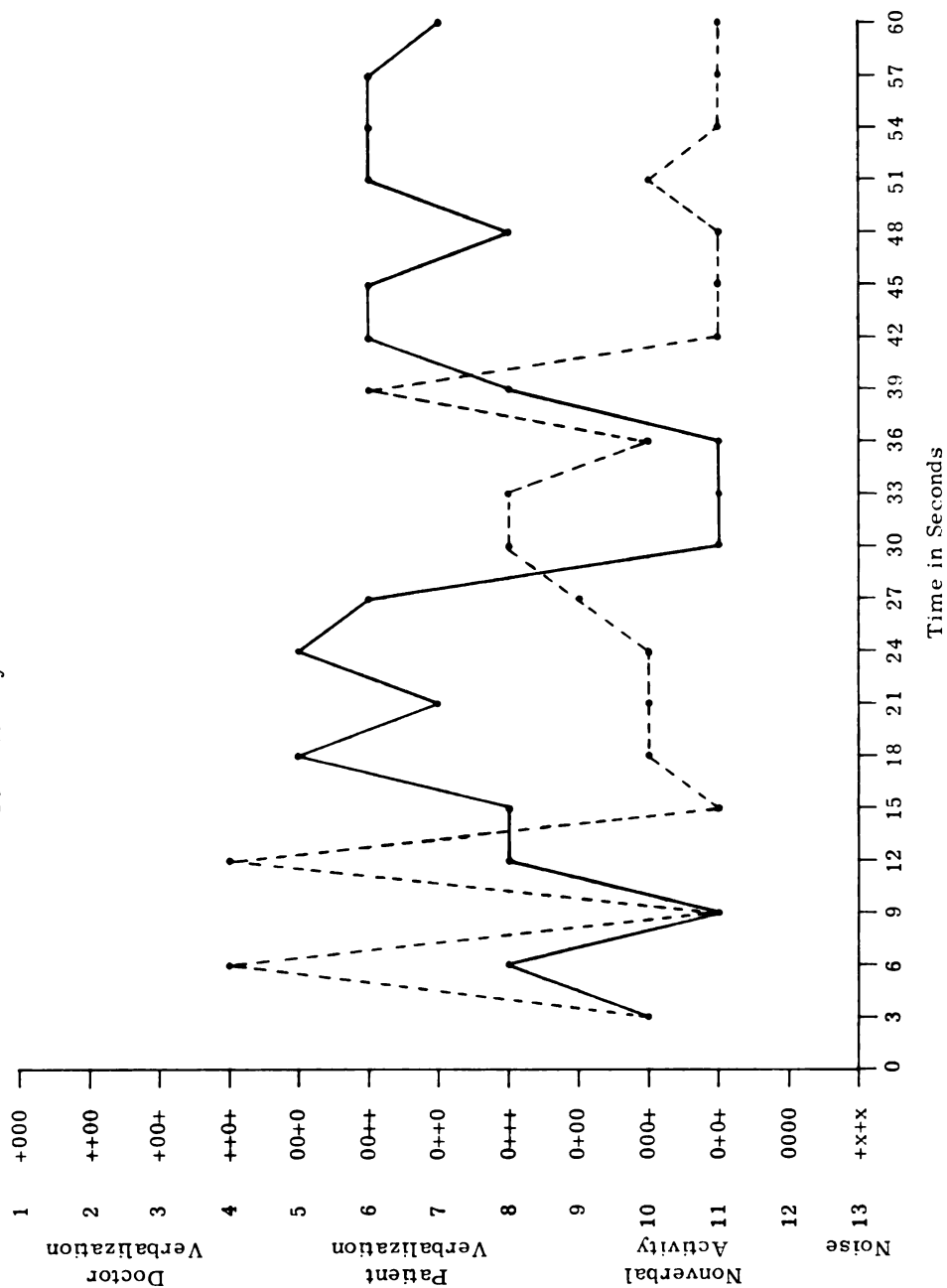
The data generated by the interaction categories can be displayed in two ways. One is the interaction profile by which it is possible to compare the way the succeeding states of two or more communication systems evolve over time. The other is the interaction matrix which presents a summary statement of the entire interview, and which graphically represents the substructure of the interaction.

INTERACTION PROFILE

In the interaction profile, the ordinate represents each of the 13 interaction categories, the abscissa each of the sampling intervals. The graph (Figure 3-2) shows the relationship between the category in use and the duration it is used.

Figure 3-2 is a graph of two interviews conducted by Doctor I. From the graph it is possible to compare the evolution of two interactions. Two things become apparent by studying the graph. First, Doctor I has chosen to engage in very little verbal communication. In fact, the time graph, based on a three-second

Figure 3-2
Time Graph of the First Minute of Two Interviews
Conducted by Doctor One



The thirteen VNIA categories mark the ordinate; the three-second sampling interval in seconds marks the abscissa. The broken line charts interview I-1; the solid line charts interview I-3.

interval sample, indicates the doctor verbalized in only one of the interviews. Second, there is an alternating pattern of patient verbalization and nonverbal behavior. The apparent strategy of doctor I in both interviews was to encourage patient verbalization by outwaiting the patient during periods of nonverbal behavior.

The pattern in interview I-3 (solid line) begins in nonverbal behavior. After a recorded verbalization of the patient at six seconds, and more nonverbal behavior at nine, the patient enters an extensive period of verbalization including doctor nonverbal behavior at 12 seconds, 15 seconds, and 21 seconds. At the half minute mark the interaction moves from patient verbalization to nonverbal behavior. The doctor waits for the patient to continue. The patient begins verbalizing at 39 seconds with apparent nonverbal support by the doctor. The patient then continues to verbalize through the balance of the minute with the doctor supporting the verbalization nonverbally at 48 and 60 seconds.

The pattern in interview I-1 (broken line) can similarly be described. One aspect of the interview evident from the time graph is the reluctance on the part of the patient to verbalize. The doctor at six seconds and at twelve seconds attempts to begin the interview with a verbal probe. The patient was in the nonverbal state for the first 30 seconds of the interview, then begins to communicate

verbally. Again at 42 seconds, the patient lapses into nonverbal behavior where he remains throughout the remainder of the minute.

The interaction profile serves the function of examining the influence of certain system states and groups of system states on the evolution of the interaction. It is also possible to compare a number of interviews conducted by the same communicator and to check for similarities in interview strategy.

INTERACTION MATRIX

The interaction matrix is a summary which provides a map of the interaction; it can be compared with maps of other interactions or with different phases in the same interaction.

To construct the matrix (which is 13×13 because each of the 13 categories represents one row and one column in the matrix), the column of numbers representing the succeeding states of the system are considered in pairs. If, for example, the sequence of code were 6, 2, 8, 6, 6, 8, the first tally in the matrix would be placed in the matrix square formed by row 6, column 2, with the row number entered first.

This tally represents the transition between two observed states. In this case the doctor, talking and moving in the absence of patient activity in time 1, continues in that mode at time 2. The

Figure 3-3

Interaction Matrix Generated from
a Five-minute Doctor -Patient Interview

	C_1		C_2			1	2	3	4	5	6	7	8	9	10	11	12	13
	V	NV	V	NV														
1	+	0	0	0														
2	+	+	0	0									1					
3	+	0	0	+											1			
4	+	+	0	+							1		1					
5	0	0	+	0											2			
6	0	0	+	+			1				1	9		2		11	3	
7	0	+	+	0														
8	0	+	+	+							5		3		3	1		
9	0	+	0	0													1	
10	0	0	0	+					1		7		4		8	3	5	1
11	0	+	0	+					1		3		2		2		1	
12	0	0	0	0						1	2		1	1	2		3	
13	+	x	+	x				1			2							
						0	1	1	2	2	29	0	12	1	29	9	10	3
						04				43				49				03

Each cell indicates the number of times a particular dyad occurred within the interaction. For example, the interaction moved from state 8 (0+++) to state 6 (00++) five times. (See cell defined by row 8, column 6.)

second tally in the matrix would be placed in the matrix square formed by row 2, column 8, the third in the matrix square formed by row 8, column 6, and the fourth in the matrix square formed by row 6, column 6. The procedure is continued until each of the code pairs is plotted.

The completed matrix can be considered in a number of ways. At one level, each interaction block within the 13×13 matrix represents one kind of transition. At another level, it is possible to consider the four doctor verbal categories as one transition block, and the four patient verbal categories as another. In the present research, it was decided to stay with analysis utilizing the major interaction blocks. In fact, it was almost unavoidable because of the small number of tallies in the cells of the 13×13 matrix, in part a function of the length of the interaction under study. The major blocks are lettered and will serve to complete the interaction map.

Block A is called " C_1 MONOLOGUE" and indicates that communicator one has moved from one state in which he is talking to another state (or the same state) in which he is still talking. Block B is called " C_2 MONOLOGUE" and indicates the same thing about communicator two as Block A indicates about C_1 .

Block C indicates the transition from C_1 to C_2 while Block D indicates the transitions from C_2 to C_1 . Blocks E and F indicate

Figure 3-4

Major Blocks in the 13×13 Interaction Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	+000	A				C				E				M
2	++00	C_1 monologue				C_1 to C_2				C_1 to NV				C_1 interrupted
3	+00+					transfer								
4	++0+													
5	00+0	D				B				F				N
6	00++	C_2 to C_1				C_2 monologue				C_2 to NV				C_2 interrupted
7	0++0	transfer												
8	0+++													
9	0+00	G				H				I				O
10	000+	NV to C_1				NV to C_2				NV				NV to noise
11	0+0+													
12	0000													
13	+x+x	J				K				L				P
		noise to C_1				noise to C_2				noise to NV				prolonged noise

Each of the major interaction blocks is descriptive of a type of dyadic exchange. Block C, for example, represents a change in which C_1 stops talking and C_2 begins.

transitions from C_1 and C_2 respectively to states of nonverbal activity. Similarly Block G and H indicate transitions from nonverbal activity to either C_1 or C_2 speaking; Block I indicates continual nonverbal interaction.

Block J indicates that both C_1 and C_2 are in simultaneous verbal active states and that C_1 then takes over. Block K indicates the same, with C_2 taking over verbally. Block L indicates a movement from confusion (C_1 and C_2 , respectively, are being interrupted). Block M indicates that while C_1 is talking, C_2 interrupts causing verbal confusion. Block N indicates the same except C_2 is interrupted by C_1 . Block O indicates those situations in which both C_1 and C_2 are silent and they begin to verbalize simultaneously. Block P indicates continued C_1 and C_2 talking simultaneously.

INDICES

The interaction matrix provides for the generation of two indices. The first is the frequency with which the transitions between system states can be assigned to specific interaction blocks. This index will be called the interaction frequency. A second index can be generated by computing the ratio between any two interaction matrix blocks. This index will be called interaction frequency ratio.

Interaction Frequency

Isolated blocks within the whole matrix can be compared with those of another by comparing the rank order of the block frequencies. Column totals can also be compared. These column totals provide a measure of the amount of time spent in each state. By summing the first four columns, the total amount of time which C_1 verbalized in the interaction can be computed. Similar calculations can be made for C_2 and for the amount of nonverbal interaction.

The number of times a particular system state follows another is a meaningful index of the interaction. If, for example, a great number of tallies fall in interaction Block A, it indicates that C_1 is verbally dominating the interaction. If a large number of tallies fall into interaction Block G, it indicates that during times of nonverbal behavior only, C_1 has a tendency to break the silence. Each of these indices allow the researcher to make meaningful statements about the nature of a particular interaction. After interaction matrices have been generated for a number of interviews conducted by the same communicator, it is possible to compare the tallies in the interaction blocks.

Interaction Frequency Ratio

One useful index in this area might be the ratio of the amount of time spent in verbal activity to the amount of time spent

in nonverbal activity. Another would be the ratio between the verbalization of C_1 and C_2 .

The row totals of 3, 4, 6, 8, 10, and 11 provide a measure of the first communicator's total nonverbal activity. The ratio formed by it and the row totals 1, 2, 5, 6, 9, and 11 yield an index of the two communicators' nonverbal activity.

Any of the large blocks within the matrix can also be compared with other blocks in the matrix. It might be meaningful to know, within the context of this study, the ratio of doctor to patient monologue, or the ratio of doctor or patient monologue to continual nonverbal interaction. One caution should be sounded. In the construction of interaction frequency ratios it is important to be aware of the assumptions stemming from the mathematical model underlying the VNVIA. These assumptions will be considered at length in Chapter V.

MATRIX PROFILE

It is possible to break the interaction data into units of one minute. The data in each unit can be converted into an interaction matrix. A series of such matrices constitutes the matrix profile. From the matrix profile it is possible to check on the shifts occurring in an interaction on a minute-by-minute basis.

Summary

The Verbal-Nonverbal Interaction Analysis is a new methodology specifically designed to code the verbal and nonverbal activity produced by communicators in a dyadic interaction. The set of thirteen categories, which comprise the VNVIA, can be applied to generate data about the communication band utilization of two interactants. The data can be displayed in two forms. One is the interaction profile which produces a linear view of the interaction as it evolves from state to state. The other is the interaction matrix which represents a map of the total interview structure. The interaction matrix provides for the construction of indices which describe the characteristics of the interaction. An interaction frequency is an index which describes the number of times a particular interact occurs during an interaction. An interaction frequency ratio is an index which describes the occurrence of a particular class of interacts relative to the occurrence of some other class.

The VNVIA suggests some interesting possibilities for research. However, the next step is to determine its reliability.

CHAPTER IV

RELIABILITY

Before a new methodology can be utilized with confidence, its reliability must be determined. Two factors must be considered to fully test the reliability of the VNVIA. One factor relates to whether observers, using the VNVIA category system, can generate similar interaction matrices when coding the same interview. The other factor relates to whether the use of a sampling interval is a feasible way of generating interaction data.

The first factor concerns coder variables. It suggests questions about intercoder agreement, observer training, observer fatigue, and data replication. The second factor concerns the sampling interval. It suggests questions about the optimum length of the sampling interval and the effect of varying the starting point of the sampling interval.

VNVIA RELIABILITY

Reliability: Coder Variables

When dealing with coder variables the distinction should be drawn between those situations in which observers code interactions

independently and do not resolve differences and those situations in which observers code interactions independently and then compare their codings so that disagreements among them can be resolved, and a single interaction matrix constructed.

In the first situation, where observers do not compare results, separate interaction matrices are generated from the data produced by each observer. Intercoder reliability is determined by statistically comparing these interaction matrices. A matrix generated from the data produced by one observer is called an uncorrected matrix.

In the second situation, where observers compare the results of their coding and resolve disagreements, a single interaction matrix is generated. This matrix is called the corrected matrix. The VNVIA was developed under the assumption that observers would compare the results of the coding and resolve disagreements. Therefore, when determining the reliability of replicating a previously generated interaction matrix, the corrected matrix is used.

An initial concern when testing reliability is whether or not two or more observers independently coding the same interaction can generate the same result. If intercoder agreement is low or non-existent, it is an indication that the content categories are not sufficiently defined to be consistently applied by several coders.

Usually categories which are clearly stated and easily understood by observers will eliminate problems of poor intercoder reliability.

When considering the reliability of a new methodology like VNVIA, the first question which needs to be answered is:

1. Do several observers using the VNVIA generate essentially the same result when coding the same interview?

A second concern involves the training of observers. Specifically, it is useful to know how long it takes observers to learn the VNVIA category system and consistently apply it to dyadic interaction. The time which observers spend adjusting to the coding process is defined as training time.

There were no formal attempts at training observers. The task was easily understood and almost all of the individuals who applied as observers had little trouble identifying verbal and nonverbal activity. The second question which this investigation will answer is:

2. How much training is needed before observers generate reliable interaction maps?

A third concern is observer fatigue. When observers are asked to bring their full faculties to bear in a complex coding task,

the problem of fatigue becomes important. Combining a high attention level with a task that lacks sufficient intellectual challenge leads to an increased probability that observers will code interactions differently.

For instance, when three observers are independently coding the same interaction and in the process of coding make one judgment every three seconds, it is expected that at each three-second interval all three observers might not make the same response. This lack of unanimity is defined as observer disagreement. In some interviews there are likely to be more observer disagreements than in others. Observer fatigue could be one factor which influences the number of disagreements. If fatigue is related to observer disagreements, then as the length of the coding session increases the number of observer disagreements should also increase. In order to make efficient use of trained observers, it was hoped that observers could code for a three-hour shift with a fifteen-minute break every hour and not show an increase in the number of observer disagreements. The third question which this investigation will answer is:

3. Does the factor of fatigue create a significant change in the number of observer disagreements?

The fourth concern involves the replication of data. Replication is that aspect of reliability which requires that a particular

group of observers, settling disagreements among themselves, can generate the same data when coding the same interaction at two points in time.

Supposedly, when observers compare the results of their coding and resolve disagreements, the matrix which results should be the most accurate possible. If the VNVIA is a reliable methodology, then two corrected interaction matrices representing the same interaction generated at two different times should be similar.

The fourth question which this investigation will answer is:

4. Do several observers, resolving disagreements, generate substantially the same result, when coding the same interaction at two different times?

Reliability: Sampling Interval

During the development of the VNVIA, a key question was: how frequently should the states of the communication system be sampled? Amidon and Flanders (1967) sampled every three seconds. Others (Chapple, 1949; Cassota et al., 1964) have used continuous coding. The three-second sampling has at least two advantages: (a) it requires no special equipment such as an event recorder, and (b) coders can be trained to work at that speed. The main question was: does a different picture of interaction emerge with a more "fine-grain" sampling? This question could only be answered by

increasing the number of judgments to one per second or less. Since such a judgment rate did not appear humanly possible, it was decided that some type of continuous recording method had to be used. The notion of continuous recording is introduced at this point because researchers should be made aware that it represents a viable alternative to the three-second interval. It is not the purpose of this thesis to determine which method is best; both offer some potential for generating data. This thesis merely attempts to raise the issue and to present some guidelines for the researcher interested in exploring the potential of continuous coding.

In the continuous method, observers, coding a single band of a single interactant, operate a switch which activates the stylus on an event recorder. Whenever a change in activity is detected, the button is pressed and the recorder makes a record of the presence or absence of activity.

Once a continuous recording is complete, the record can be broken down into intervals or units as small as one second. A three-second interval sample generated from continuous coding is called a coarse grain sample. A one-second sample generated from continuous coding is called a fine grain sample.

In this study several interactions were coded two different ways. First they were coded on the basis of the interval sample.

Second, they were coded continuously. When completed, the continuous record was converted to a coarse grain sample. This manipulation provided an opportunity to compare an interval and continuous recording. The question which this investigation explores is:

1. Does continuous coding produce the same result as interval coding?

Another issue which deserves some attention is the size of the sampling interval. Though there is some evidence that the three-second sample is adequate for an interaction analysis (Amidon and Flanders, 1967), no one has undertaken a comparative investigation of coarse-grain vs. fine-grain sampling. In order to explore this issue, a fine grain sample was generated from the continuous record. Here again the purpose was not to concretely determine whether or not the interval approach was feasible, but rather to check if the interval sample produced an adequate picture of doctor-patient interaction. The question under investigation is:

2. Does the employment of coarse grain sampling lead to a different interaction map than the employment of fine grain sampling when the interaction is the same?

The last issue concerns the point in the interaction where the sampling interval is initiated. There is the possibility that a

coarse grain sample initiated at one point in an interview might produce an entirely different interaction matrix than a coarse grain sample initiated one second later. A test of the sampling interval should support the assumption that a coarse grain sample, initiated anywhere in the interaction, provides an accurate picture of the communication band utilization of the interactants.

To test whether a delay would alter the form of the interaction matrix, two coarse grain samples were generated from the same interaction. One sample (B) was initiated one second after the first (A). The question under investigation is:

3. Is the sample initiated at interval T the same as the sample initiated at T plus 1?

PROCEDURE

Interviews

The reliability of the VNVIA method was tested using the first five minutes of a sample of 37 interactions systematically selected from 140 ten-to-twenty minute simulated doctor-patient interactions. The interactions were video taped as part of the doctor-patient relationship course in the College of Human Medicine at Michigan State University. The "doctors" in the interactions were second year medical students, and the "patients" were actors programmed with a range of

illnesses, physical and mental, suggested by the faculty of the College of Human Medicine.

The actors, most of whom are affiliated with the Department of Theatre, were briefed about the range of symptoms that a person suffering venereal disease, for example, might have. The actor was then allowed to develop his own character around the disease and symptoms. Some actors chose simply to be themselves with the addition of the malady. Others worked out very elaborate characterizations and in the interaction acted the part. The doctor-student was assigned to meet with a patient-actor at a prearranged time.

Recording

The interactions were conducted in two rooms equal in size and each room was equipped with two television cameras out of sight of the interactants. A diagram of the room can be found in Appendix II.

One television camera was focused on each of the interactants. The picture can be best described as a medium shot (MS) or a waist shot where neither the doctor nor patient could be seen below the knees. The images from the two cameras were combined to form a split-screen effect. The split-screen taping helps to eliminate the interpersonal space between interactants and makes each figure larger and easier to observe.

Interval vs. Continuous Sampling

In Chapter III a brief distinction was drawn between continuous coding and coding at a fixed interval of three seconds.

The mechanics of the three-second interval sampling are very simple. Observers are presented with a score sheet (Appendix III) which includes 100 small rectangular cells arranged in five columns. Each of the columns contains twenty cells, the number of judgments related to one minute of coding time at the three-second interval. Observers watch the video tape replay and concentrate on one of the communication bands used by one of the interactants. When the 600 Hz cue tone is heard, observers decide whether they perceive activity. If activity is perceived, the observer indicates that fact by placing a vertical mark in the column cell which corresponds to the cue tone. Every time the cue tone sounds, the observer judges whether activity is occurring in a particular band and that judgment is made a matter of record. The method is essentially one in which observers look-judge-record-wait-look etc.

The mechanics of continuous coding are a bit more complex than interval coding. First, it is necessary to have an event recorder or some similar device, which over time continually spews forth rolls of specially calibrated paper. Most event recorders

operate in a similar way. A stylus in contact with a roll of lined paper draws or etches a line on the paper as it is ejected from the recorder at a given rate of speed. In the continuous recordings made for this thesis the rate was 1800 inches/hour or about $\frac{1}{2}$ inch/second. The recorder paper was lined at $\frac{1}{2}$ -inch intervals, which made reading very easy.

The recorder is attached to a switch operated by a very sensitive push button. When the button is not pressed, the recorder stylus tracks along one line. When the button is pressed, the stylus jumps to another track, recording continuously in that track until the button is released. Observers were told that when they perceived activity in the band under consideration, the button should be pressed and held until the activity ceased. Observers with the aid of the recorder produced a record of the occurrence and duration of activity or inactivity. In order to synchronize the recording, a cue had to be introduced into the tape at the point of interaction initiation. The continuous method is different from the three-second interval coding in that observers look continuously and respond manually.

Observers

Three observers were hired and paid \$2.50/hour to code the interactions. No special training or ability was required.

However, it was necessary to interview and test a number of potential observers. Some did not qualify because they were unable to stand the pressure of the task. These potential observers were too concerned about their ability to make and record judgments within the three second interval. As a result they became easily confused, often missing a series of four or more judgments before being able to regain their composure. The observers hired were not affected by the time pressure. They worked smoothly and mechanically during most of the recording.

Observers received no special training in the use of the VNVIA. They were told about the category system and the boundaries of activity and inactivity were defined after viewing several video taped interactions. Concerning the verbal band, observers were told to code every verbalization they could hear. This included vocalized pauses and other paralinguistic phenomena. For the purpose of this analysis, paralinguistic phenomena were considered part of the verbal band. Observers were told to code all perceivable movement in the nonverbal band. The only exception was jaw and chin movements associated with talking. (See Observers' Coding Manual, Appendix VII.)

Because the video tape could be replayed, it was possible to determine and resolve observer errors. An observer error occurs

during the run of an interaction when an observer judges and records one type of event (activity in the nonverbal band, for instance) and then in the replay discovers he was mistaken. Errors of this type persisted throughout the coding of all 37 interactions, although fewer errors were recorded in the later codings. Most errors appear to be the result of two phenomena which are labeled "focusing" and "following." "Focusing" occurs when an observer locks into the perception of one feature, such as a facial expression or hand movement, missing movements in other places. "Following" occurs when the observer becomes engrossed in the flow of the interaction. Instead of keeping his gaze locked upon the individual under consideration, the observer looks at the individual who is speaking. As a result he misses movement made by the nonspeaker.

STATISTICS

The statistic employed for judging reliability is the π (pi) coefficient developed by Scott (1955) for measuring interobserver agreement where the categories form a nominal level of measurement. The pi coefficient is determined by the two formulae below:

$$\pi = \frac{P_o - P_e}{1 - P_e} \quad (4.1)$$

P_o is the percentage of coder agreement and P_e is the percentage of coder agreement expected by chance. P_e is found by squaring the proportion of tallies in each category and summing these over all categories.

$$P_e = \sum_{i=1}^k P_i^2 \quad (4.2)$$

Here k is the number of categories and P_i the proportion of tallies falling into each category.

The π coefficient yields a figure between 0.00 and 1.00. The following example illustrates the calculations needed to find π . The formula requires that the data be converted to percentages. It is not necessary to make the percent conversion in the data generated in this study as the number of judgments made by coders equalled 100. However, while the judgments equalled 100, the number of category tallies (category tallies equal pairs of judgments) equals 99.

P_e is found by summing the square of the P_i 's. The P_i 's used to calculate P_e are taken from the column totals of observer C. They can be taken from either observer B or C. In some cases, the P_e 's generated from two observers will be different. In the example shown on the following page they are the same.

Table 4-1

Calculating Reliability by Scott's Method

Category	Observer B	Observer C	% Difference	P_i^2
1	1	1	.00	$(.01)^2$
2	11	9	.02	$(.09)^2$
3	0	1	.01	$(.01)^2$
4	9	13	.04	$(.13)^2$
5	2	3	.01	$(.03)^2$
6	27	27	.00	$(.27)^2$
7	0	0	.00	$(.00)^2$
8	30	30	.00	$(.30)^2$
9	3	3	.00	$(.03)^2$
10	3	4	.01	$(.04)^2$
11	8	5	.03	$(.05)^2$
12	3	3	.00	$(.03)^2$
13	2	0	.02	$(.00)^2$
TOTALS	99	99	.14	.19 = P_e

$P_o = 1.00 - .14 = .86$ percent observer agreement

$P_e = .19$ percent observer agreement by chance

When P_o and P_e have been calculated, they are plugged into the π formulae. The π where $P_o = .86$ and $P_e = .19$ is .83. The π of .83 indicates high interobserver agreement. Scott (1955) suggests that a π of .80 or greater is an indication of a strong relationship.

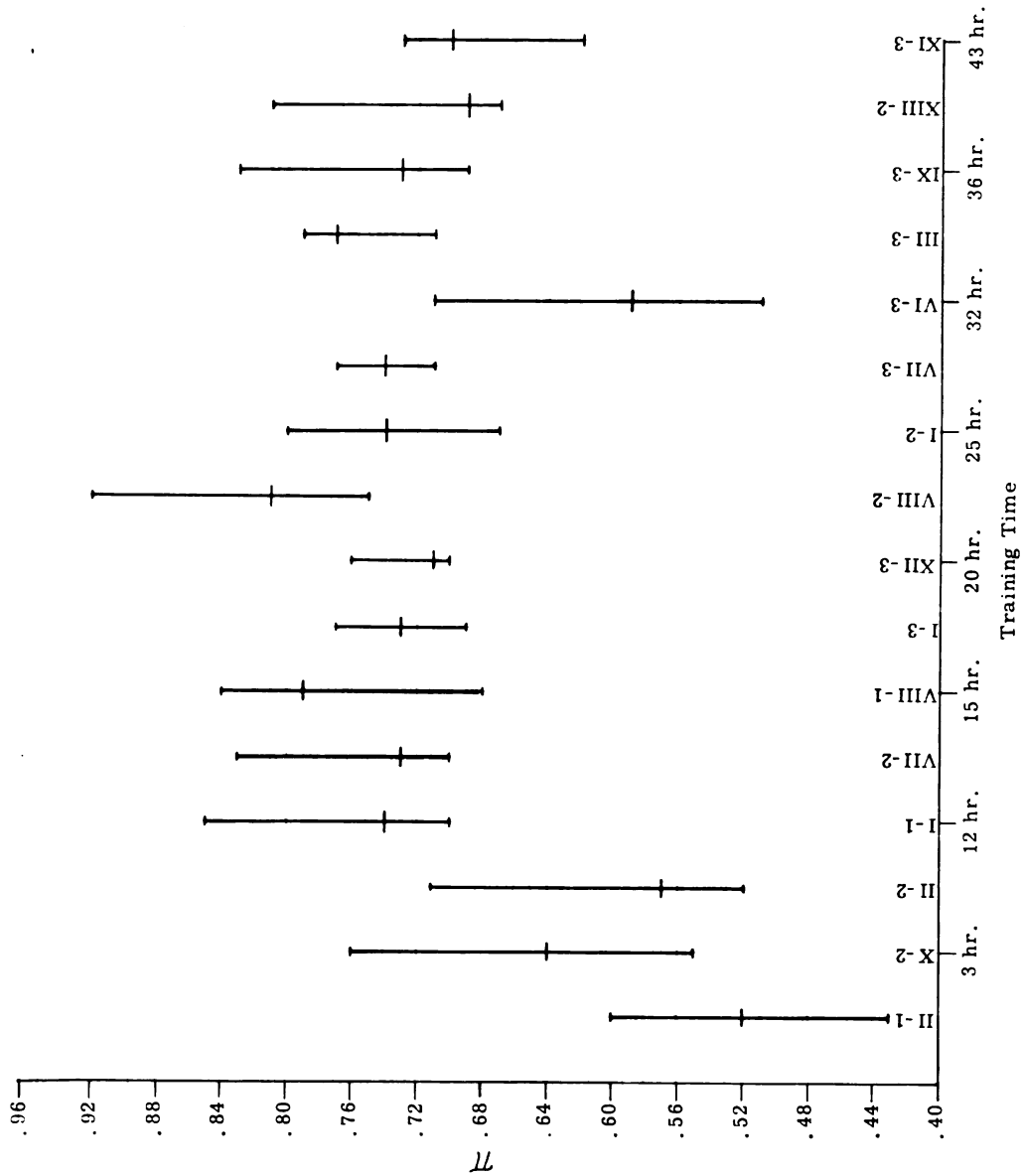
RESULTS

The results of the test of reliability are reported in two major sections. Section one centers on coder variables; section two centers on the sampling method.

Reliability: Coder Variables

Intercoder Agreement. The graph, Figure 4-1, shows the range of correlation coefficients generated by all possible pairs of observers at different times throughout a coding period of three weeks, representing about 43 hours of training time. When three observers are used to code a single interview, it is possible to generate six permutations when two observers are considered at a time. These permutations are a, b; a, c; b, a; b, c; c, a; and c, b. For each permutation a correlation coefficient can be computed. The π coefficients computed for interaction II-1, for example, are .46, .54, .43, .60, .52, .52, and represent a range of coefficients

Figure 4 - 1
Graph Showing Range of Pi Coefficients for Each Interaction in a Series of
Interactions Defining a Continuum of Training Time



The numbers II-1, X-2, designate specific interactions. For each interaction it is possible to construct a range of pi coefficients. The vertical lines mark that range for each interaction. The horizontal line marks the median of each range. Below the interaction designates are numbers referring to the amount of training time which had elapsed at the time the interaction was coded.

between .43 and .60. This range is presented for each of the interviews sampled along a time continuum representing from two to forty-three hours of training.

The time continuum was developed by selecting a series of three interactions at a regular interval during the process of coding thirty-seven interactions.

The graph demonstrates that once a certain level of reliability is reached, the correlation coefficient of observer pairs indicates little fluctuation. A π coefficient of .70 was considered a high level of agreement. Scott (1955) indicates that a π of .80 is preferable. However, the content categories studied by Scott represent a single element, i.e., teacher lecturing as opposed to teacher asking questions or giving directions. In the case of VNVIA, four elements, each judged independently, are combined to construct each content category. Such a procedure reduces the possibility of a high π . Scott (1955) suggests that a π of .70 is an acceptable correlation coefficient. It is unfortunate that the significance of the π coefficient cannot be calculated.

Figure 4-1 indicates that the median for each distribution, except interaction VI-3, is a π of .69 or better. The consistently high correlation coefficients suggest that intercoder reliability is good. Perhaps the one deviant case deserves some comment. A

few of the doctors who conducted interviews, because of the subtlety of their nonverbal behavior, provided problems for the observers. In the sample of 37 interviews selected for this investigation, one doctor (VI) repeatedly baffled observers. The problem of making and recording fine distinctions will be considered in detail in the final chapter of this thesis.

As observers coded more and more interviews, it is reasonable to expect that reliability would improve. In other words, it was hoped that intercoder reliability would be generally higher over time. Along with improved reliability coefficients, it might be expected that there would be less variability in the range of correlation coefficients generated by all possible pairs of coders. Figure 4-1 does not support that expectation. While the variability among correlation coefficients is slightly reduced over time, there is no way to test whether that difference is meaningful.

Training Time. The graph (Figure 4-1) indicates that after approximately twelve hours of coding, observers reach the upper limit of agreement. However, the graph also demonstrates that once the upper level is attained, there is no complete assurance that observers will operate at that level in all succeeding situations.

When the communicators in the dyad are verbally and non-verbally active or inactive beyond all shadow of a doubt, when one

or both are clearly uttering words and gesturing emphatically, reliability is high and observers can be taught to code dyadic interaction with little or no difficulty. In fact, in those interactions where the verbal and nonverbal activity is definite and easily distinguished, coder training might not be needed. The subtler verbal and nonverbal activities such as marginal finger movements, head nods, vocal pauses, and throat clearing, reduce reliability and make training coders mandatory. Often, however, the problem is not one of recognizing these marginal activities as much as it is training coders to respond rapidly to them, so that the observer coding rhythm is not interrupted. While twelve hours of coding is usually enough time to expose observers to the majority of the kinds of marginal behavior they will experience, it does not mean that they have been exposed to all kinds of marginal behavior. And, it does not mean they have experienced a full range of "pace," the varying speeds of interaction.

When examining the tape of interview VIII-2 (Figure 4-1), there is clearly a complete lack of marginal verbal and nonverbal behavior. The absence of marginal behavior in VIII-2 makes this not only an easy interview to code, but also produces coder reliability coefficients which are the highest observed in the sample of 37 interviews.

On the other hand, it was apparent when viewing the tape of interview VI-3 (Figure 4-1) that it included vast amounts of marginal verbal and nonverbal behavior. In fact, interview VI-3 brought together a doctor and a patient, each of whom, in other situations, provided observers with a difficult time because of the large amount of marginal activity in evidence. This was particularly true of the nonverbal band.

Fatigue. The length of the coding session can affect coding efficiency. Observers spending too long a duration in the coding situation will tire and make increasingly more errors. In the coding of the 37 interviews, observers were asked to code for periods of three hours with approximately a fifteen-minute rest period each hour. It was predicted that a coding period of three hours was not sufficiently long to significantly increase the number of coder disagreements.

A median test was used to determine whether interviews coded in the last hour of the three-hour coding session differed significantly from those coded during the first hour.

Each communication band was considered separately. For the verbal band the χ^2 was .308 at $df = 1$ and was not significant. For the nonverbal band the χ^2 was .308 at $df = 1$ and was also not significant.

Though no test was made beyond three hours, observers indicated that because of the tedious nature of the coding task, they were reluctant to continue beyond the three-hour sessions.

Almost all of the three-hour sessions were held in the evening. On three occasions, sessions were held in the morning. While the enthusiasm for the task was greatest in the morning, the amount of time necessary to do the task and the number of disagreements per interview were not substantially different from interviews done in the evening.

Replication. Five interviews were selected to spell out the issue of replication. The five interviews, V-1, X-2, V-2, I-1 and III-3, were selected for two reasons. First, they represented, except for III-3, some of the first interviews coded. It seemed reasonable to assume that if there was good fidelity between the interaction matrices representing the same interview coded at two different times, most of the others could also be reproduced with a similar fidelity. By selecting initial interactions it was also possible to determine whether observers had altered their meaning for the set of interaction categories.

Another reason for selecting first interviews was to provide for the greatest period of time between the initial coding and the

replication. In all, six weeks elapsed between the recording of the interviews at T_1 and T_2 .

Table 4-2 shows the correlation coefficients for the five interviews selected for this study. The correlation coefficient for V-1 represents the agreement between the corrected matrix of interview V-1 generated at T_1 and the corrected matrix of interview V-1 generated at T_2 .

Table 4-2
Correlation Coefficients for Five Interactions
Coded Six Weeks Apart

	Interview				
	V -1	X -2	V -2	I -1	III -3
π	.70	.77	.73	.73	.70

The generally high and consistent π coefficients tend to lend support to the proposition that a group of observers, resolving disagreements in their coding, can at two different times generate substantially a similar result when coding the same interaction.

Reliability: Sampling Interval

Interval vs. Continuous Coding. The data reported in the following sections represent a very limited test of the VNVA.

Because the researcher had only "brief access" to an event recorder, a very small amount of data were collected. On one hand, the data provide only a preliminary view which attempts to spell out the issue regarding the sampling interval. On the other hand, the limited data provide some useful information to future researchers.

The initial issue concerns whether an interval sample generated by two methods provides essentially the same result. Two interviews were selected on the basis of the frequency with which the doctors and patients appeared in the sample of 37 interactions. At least one of the two doctors and two patients selected for this study appear in 27 of the 37 interactions which make up the sample.

If the two matrices generated by different methods were highly correlated, we might conclude that there is essentially little or no difference between the two. The limited evidence is not encouraging. In interview I-1 (Table 4-3) a π of .81 indicates a high correlation between the interval coding and the continuous coding. In interview III-2, however, the π of -.09 indicates a weak relationship.

A careful analysis of interview III-2 indicates that the poor relationship was the result of an increase in coding doctor nonverbal behavior with the continuous method, both during times of doctor and patient verbalization. Had the amount of doctor nonverbal behavior coded by the observers been reduced by one-half, the correlation

between the three-second continuous and three-second interval in interview III-2 would have been as strong as the correlation in interview I-1.

Table 4-3
Comparison of Various Sampling Intervals

		Interviews	
		I-1	III-2
Continuous vs. interval		.81	-.09
Coarse grain vs. fine grain		.90	.84
Change of starting point	T and T+1	.85	.69
	T and T+2	.79	.69
	T+1 and T+2	.77	.78

There are two possible explanations for the increase in doctor nonverbal behavior coded by observers. The first is that the coarse-grain data derived from the continuous coding are correct and that observers using the interval coding failed to record all the nonverbal behavior which occurred. The other is that during the continuous recording observers coded more nonverbal behavior than was present. This could come about in a number of ways. First, observers could have confused the direction of the button push. Instead of pushing down when the activity began they pushed

down when the activity stopped. The other possibility is that they became so engrossed in the interview (a problem when not actively engrossed in making a new response every three seconds) that the observer failed to release the button at the appropriate time.

The result is a bit distressing and obviously suggests a need for further study.

Coarse Grain vs. Fine Grain. With the continuous method of recording it is possible to construct a fine grain sample. If an interaction matrix generated on the basis of a coarse grain sample correlates highly with an interaction matrix generated on the basis of a fine grain sample, then there is some support that the coarse grain sample provides an accurate picture of the interaction.

From the continuous recording of interviews I-1 and III-2, coarse grain and fine grain samples were constructed and used to generate interaction matrices. In both interactions the matrices correlated highly. The π in interview I-1 (Table 4-3) was .90, while the π in interview III-2 was .84. These represent some of the highest π coefficients calculated. This support, though limited by the small sample, is very encouraging and suggests that the coarse grain sample is a viable interval for generating interaction matrices.

Change of Starting Point. From the continuous recording, two coarse grain samples were constructed. The second sample was initiated beginning at a point in the interaction one second behind that at which the first sample was started. Interaction matrices were generated for each of these samples and compared. In both interview I-1 and interview III-2, the first sample highly correlates with the second, whose point of initiation followed that of the first by one second. The π for interview I-1 (Table 4-3) is .85. The π for interview III-2 is .69.

This support, though limited by the small sample, is encouraging. It suggests that a sample can be initiated just about anywhere at the beginning of an interaction, without the fear that the sample would not be representative of the interaction.

Summary

The reliability study was reported in two sections. Section one focused on coder variables. The data in section one provided good evidence for intercoder agreement, indicated that twelve hours is a sufficient amount of time to train observers, demonstrated that observer fatigue was not apparent at the end of three hours of coding, and that by utilizing a method of resolving disagreement, observers could generate substantially a similar result when coding the same interaction at two points in time.

Section two focused on the sampling interval. Here only a limited amount of data was available. There was mixed support for the proposition that identical interval samples constructed by two different methods are similar. There is limited but good evidence that both a fine grain sample and a coarse grain interval sample provide the same result. The same is true for two coarse grain samples with staggered beginning points.

The initial evidence indicates that the VNVIA is a reliable methodology which can be utilized for coding dyadic communication interactions. The next step is to consider some of the communication problems which researchers might want to investigate with the VNVIA. Because the VNVIA generates data for hypothesis testing, it is important to briefly consider one statistical tool for producing statements of significance.

CHAPTER V

STATISTICS

An important advantage of the VNVIA is its potential for comparing matrices generated from two interactions. When differences are hypothesized, a statistical test must be available for determining whether the observed differences are greater than those expected by chance.

Selecting a statistic for comparing VNVIA interaction matrices is complex because the states of the system which form the interaction profile are mutually dependent. A sequence of units so interrelated is called a Markov chain. Any sequence of units (in the case of the VNVIA, succeeding states of the system) is a Markov chain if, roughly speaking, any prediction about system state x_{n+1} , ..., knowing system states $x_1, \dots, x_n$, may without loss be based on system state x_n alone. In other words, the state of an interaction system observed at T_3 is not independent of the state of the system at T_2 or, for that matter, at T_1 . The result is that cell frequencies generated by VNVIA are not independent and a standard type of statistical analysis cannot be used.

In an article published in The Annals of Mathematical Statistics, Billingsley (1961) has developed a rationale for statistical methods in Markov chains. One method suggested by Billingsley has particular relevance for analyzing data generated by the VNVIA.

The method allows for the statistical comparison of two frequency matrices utilizing the χ^2 sampling distribution. While the χ^2 formula developed by Billingsley cannot be directly applied to the matrices generated by VNVIA, a variation of that formula is useful. The formula will be discussed in the paragraphs below.

Function

When research data consist of frequencies built from mutually dependent observations into a set of discrete categories, the χ^2 for analysis of Markov chains should be used to determine the significance between two independent interactions. The level of measurement is nominal.

The hypothesis under test is that the two interactions differ with respect to some characteristics and therefore with respect to the frequencies in the cells of the interaction matrix.

Method

The comparison of matrices is made between the frequencies in the interaction cells. The following assumptions must be met when two matrices are compared.

1. The matrices must be square and of the same size. It is not possible to compare a 9×9 matrix with a 9×7 or 12×12 .
2. There can be no row in either matrix whose sum is zero. While it is possible for a zero to occur in any matrix cell, an entire row of zeros must be avoided.
3. The interactions from which the matrices are generated must be independent. The same interviewer or interviewee cannot occur in the two interactions whose matrices are being compared.

It is possible to combine or pool a number of interaction matrices. Pooling several matrices is accomplished by adding them together. For instance, if the frequency in the cell defined by row 1, column 2 in matrix I is 10, and the cell defined by row 1, column 2 in matrix II is 15, and the cell defined by row 1, column 2 in matrix III is 12, then the total in row 1, column 2 pooled matrix would be 37. Similar arithmetic is applied in the case of each matrix cell.

When matrices are pooled, care must be taken not to violate the assumptions of independence which underlie the statistical model.

4. In pooling a number of interaction matrices, care must be taken not to allow a given interactant to be represented more than once in the interactions to be pooled. If one interactant appears more than once in a series of pooled interactions, the assumption of independence is violated.
5. In comparing two matrices which represent the pooling of several interactions, care must be taken to avoid having any one interactant appear in both poolings.

The χ^2 for Markov chains is computed in two steps, utilizing the following formulae. In step one, a probability matrix or p matrix is derived using the formula

$$p_{ij} = \frac{f_{ij}^{(1)} + f_{ij}^{(2)}}{f_{i.}^{(1)} + f_{i.}^{(2)}} \quad (5.1)$$

p_{ij} is the probability for the p matrix cell formed by the i th row j th column. $f_{ij}^{(1)}$ is the observed frequency in the i th row j th column of one interaction matrix, and $f_{ij}^{(2)}$ is the observed frequency in the i th row j th column of the other. $f_{i.}^{(1)}$ is the sum of the i th row in one interaction matrix, and $f_{i.}^{(2)}$ is the sum of the i th row in the other.

Step two is the calculation of the χ^2 . The null hypothesis may be tested by

$$\chi^2 = \sum_{ij} \frac{(f_{ij}^{(1)} - f_{i.}^{(1)} p_{ij})^2}{f_{i.}^{(1)} p_{ij}} + \sum_{ij} \frac{(f_{ij}^{(2)} - f_{i.}^{(2)} p_{ij})^2}{f_{i.}^{(2)} p_{ij}} \quad (5.2)$$

where $p_{ij} \neq 0$

The formula indicates that the sum of the observed frequencies in each matrix row is multiplied by the probability of each matrix cell, subtracted from the observed frequency in each matrix cell, squared and divided by the sum of the observed frequencies in each matrix row multiplied by the probability of each matrix cell.

The degrees of freedom are based on the proportions in the p matrix. The formula for the degrees of freedom is:

$$df = \sum_{i=1}^{K_i} (K_i - 1) \quad (5.3)$$

Where K_i equals non-zero entries in the i th row, in the p matrix.

EXAMPLE

The application of the statistic can be seen in the comparison of two interaction matrices. The matrices in Table 5-1 were

generated from two clinical medical interviews. In each case the patient was asked to respond to the interview experience and tell whether he felt the interaction was successful or unsuccessful. Interaction matrix IV -1 represents the structure of an interview considered by the patient as being extremely successful. Interaction matrix XII -7 represents the structure of an interview considered by the patient as being extremely unsuccessful.

A rationale constructed from the nondirective theories of psychotherapy might suggest that patients in a clinical interview, where the doctor provides an opportunity for them to freely express themselves, would perceive the interaction as successful more often than those who are in some respect inhibited by the doctor. This rationale leads to the hypothesis that interactions perceived as successful should show more patient verbalization and less nonverbal monologue than interactions perceived as unsuccessful.

The null hypothesis, H_0 , would predict that there would be no differences between the two interaction matrices. Hypothesis H_1 would predict that the interaction map of the successful interview will differ from the interaction map of the unsuccessful interview.

The statistical test for this hypothesis is the χ^2 for the Markov chains. The significance level is set at $\alpha = .05$, and the

χ^2 computed from formula 5.2 has a sampling distribution approximated by the chi-square distribution.

Table 5 -1

Two Interaction Matrices Representing
a Successful and Unsuccessful Doctor -Patient Interaction

Matrix IV -1 (1)						Matrix XII -7 (2)					
	A	C	E	total			A	C	E	total	
1-4	0	3	1	4		1-4	16	2	14	32	
5-8	D	B	F			5-8	D	B	F		
	1	20	20	41			1	6	5	12	
9-12	G	H	I			9-12	G	H	I		
	2	18	28	48			15	4	36	55	

For the purpose of this analysis, row-column 13 has been eliminated. According to the second assumption (page 75), there can be no row or column whose sum is zero. Because this is true of matrix XII-7, the row-column 13 has been removed from both matrices. Because the missing N in matrix IV-1 is small, the chi square is not unduly affected.

Letters A through I designated the interaction cells. 1-4, 5-8, and 9-12 designate the three matrix rows. The totals for each row are found under total.

The p matrix is generated using formula 5.1. The p for interaction cell A is found in the following manner

$$p_A = \frac{f_{A(1)} + f_{A(2)}}{f_{1-4(1)} + f_{1-4(2)}}$$

$$p_A = \frac{0 + 16}{4 + 32}$$

$$p_A = .44$$

The p matrix for the matrices in Table 5-1 is:

p Matrix

A	C	E
.44	.13	.43
D	B	F
.03	.49	.48
G	H	I
.17	.21	.62

In the construction of the p matrix the sum of the rows must always equal 1.00 exactly. This is usually accomplished by figuring the cell proportions to four decimal places and rounding.

When the p matrix is completed it is used to determine the expected frequencies for each cell.

Table 5 -2

Observed and Expected Frequencies for
the Two Interaction Matrices

Cell	$f_{ij}^{(1)}$	$f_{i.}^{(1)}_{.pj}$	$f_{ij}^{(2)}$	$f_{i.}^{(2)}_{.pj}$
A	0	1.76	16	14.08
B	20	20.09	6	5.88
I	28	29.76	36	34.10
C	3	.52	2	4.16
D	1	1.23	1	.36
E	1	1.72	14	13.76
F	20	19.68	5	5.76
G	2	8.16	15	9.35
H	18	10.08	4	11.55

Because the expected frequencies are extremely low, it is necessary to compute the χ^2 using the Yates correction.

The data in Table 5-2 yield a χ^2 of 26.06 with a Yates correction. The degrees of freedom for a 3×3 p matrix in which no cell equals zero is six (6).

The probability of occurrence under H_0 for $\chi^2 \geq 26.06$ with $df = 6$ is $p < .001$. Inasmuch as the p is less than $\alpha = .05$, the decision is to reject H_0 in favor of H_1 . We would be led to the conclusion that the interaction pattern of the successful interview does differ from the unsuccessful interview.

CHAPTER VI

AN APPLICATION OF VNVIA

Everyone who has been involved to any extent in dyadic communication is aware that some interactions are more satisfying than others. Many people are disturbed by interactions in which the other person in the dyad totally dominates the interaction. Communication of this type rarely provides an opportunity for a meaningful exchange of ideas. These interactions are frustrating, uncomfortable and disappointing and generally lead to an early termination. Other interactions are characterized by lively exchanges, in which both parties in the dyad actively participate. Here individuals ask questions, freely swap ideas, and generally share in the fruits of a meaningful exchange.

The two types of interaction described above produce different patterns of verbal and nonverbal exchange, patterns which can be quantified by the VNVIA.

Individuals usually have little trouble judging interaction success. Among the interviews utilized to test the reliability of the

VNVIA, for instance, there was little reluctance on the part of patients to rate the success of interactions. Some of these ratings were very high; others were quite low. If interaction ratings of good and bad are tied to emerging interaction patterns, it is reasonable to expect that interactions rated differently should produce different interaction mappings. It was hypothesized that an interaction which received a high rating would produce an interaction pattern significantly different from an interaction which received a low rating.

In order to test this hypothesis, two interactions were selected from a group of 140 interviews. One represented one of the highest rated interactions in the group, the other, one of the lowest. Table 6-1 shows the interaction matrices corresponding to the interviews rated highest and lowest.

The statistical analysis of these matrices yields a χ^2 of 26.06, $df = 6$, $p < .001$ with a Yates correction.

The result supports the hypothesis. Interactions with extreme ratings produce interaction matrices which are significantly different from one another. However, the acceptability of the result is contingent upon several assumptions.

The first is that interaction patterns are related to judgments of interaction success. This assumption does not always hold. For instance, it is possible that interaction success might be based

Table 6 -1

Matrix Comparison: Interaction Rated Highest and Lowest

Lowest Rating					Highest Rating														
Dr. V Pat. V NV Noise Total					Dr. V Pat. V NV Noise Total														
Dr. V	A	16	C	2	E	14	M	0	32	Dr. V	A	0	C	3	E	1	M	0	4
Pat. V	D	1	B	6	F	5	N	0	12	Pat. V	D	1	B	20	F	20	N	2	43
NV	G	15	H	4	I	36	O	0	55	NV	G	2	H	18	I	28	O	1	49
Noise	J	0	K	0	L	0	P	0	0	Noise	J	1	K	2	L	0	P	0	3
Total	32	12	55	0	99	Total	4	43	49	3	99								

completely on the quality of the interaction content. It is conceivable that the quality of the interaction content is one variable not directly related to or quantified by the VNVIA. In such a case the comparison of two interaction matrices is meaningless.

A second assumption is that all successful interviews would produce similar interaction patterns. Again this assumption does not always hold. It is possible that some individuals would feel more comfortable in one interaction configuration while others would feel more comfortable in another.

For instance, one individual might give a high rating to an interaction in which the other person monopolized the interaction. Another might give a high rating to an interaction in which there was a mutual exchange of ideas. The result would be two different interaction patterns, each highly rated.

Questions raised by these and other assumptions stimulate a need for further investigation. This chapter reports the result of exploring a limited number of dyadic interactions.

The first limited application of the VNVIA utilized, as content, a group of simulated doctor-patient interactions. The interactions were selected from a series of 140 ten-to-twenty minute interviews taped as part of a course in doctor-patient relationships. The course was part of the second year curriculum in the College of Human Medicine

at Michigan State University. The interactions selected for this initial investigation were chosen in the following manner.

SELECTION OF INTERACTIONS

First a limited number of interactions (37) were selected from the original 140. The sample consisted of interactions conducted by three doctors, and granted by three patients. For the purpose of this initial study, it was beneficial to look at all of the interactions conducted by one doctor or granted by one patient. It was the only way to determine whether certain types of interaction patterns are related to a particular doctor or patient.

Selection of Doctors

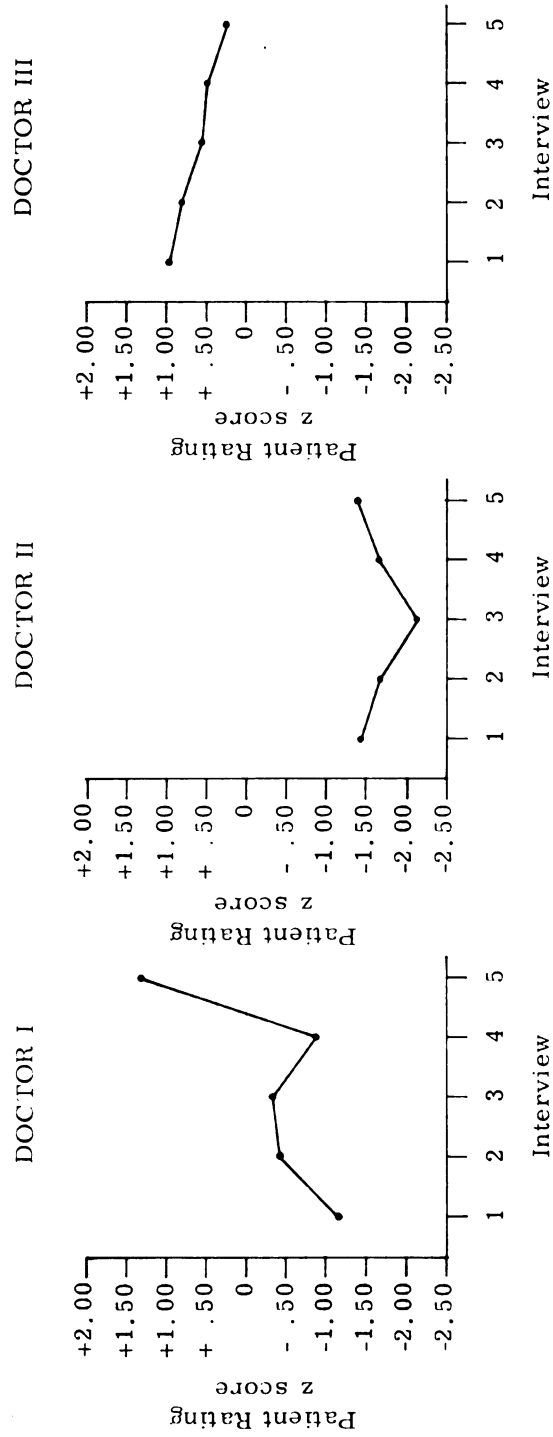
The three doctors, each of whom conducted five interviews, were selected on the basis of their overall performance with the patients. The doctors were assessed by using a rating scale described below in the section on actor debriefing.

The scale had nine items, and the highest average score any doctor could get from any one patient was 5.00. The lowest was 1.00.

One doctor (doctor I, Figure 6-1) was selected because over the five interviews he conducted, his patient ratings ranged from high to low. Another (doctor II) was selected because his ratings

Figure 6-1

Progress of Three Doctors Over Five Interviews



The interviews of each doctor are labeled in order of occurrence. Number 1 is the first interview. The patient ratings (average across nine items) were converted to standard scores for purposes of comparison.

did not change over time and were consistently below average. A third doctor (doctor III) was selected because his rating showed a slight downward trend, although most of his ratings were consistently above average.

Selection of Patients

The three patients selected for the initial study represented a range of mental and physical illnesses indicative of the majority of the sixteen patients involved in the initial 140 interactions. One of the patients (patient 1) was afflicted with venereal disease. Another (patient 2) was overly concerned because she was an Rh negative person who believed her husband to be Rh positive. The third (patient 3) was having trouble sleeping because he had just ended an affair with a married woman. The total number of interviews granted by each of these three patients varied. Patient 1 granted seven interviews. Patient 2 granted eleven and patient 3 granted ten. None of the patients saw the same doctor twice. However, each of the doctors saw two or more of the three patients selected for this initial study.

ACTOR DEBRIEFING

For this initial exploration of the VNVIA it was necessary to get some measure of the interaction independent of the quantification

which would lead to the construction of the VNVIA interaction matrix. The patient rating score also provides a measure of the success of the interaction based on the goals of the doctor-patient relationship course.

The general goals of the doctor-patient relationship course were to provide each student with the skills necessary for establishing a professional relationship with patients, and for systematic and efficient data gathering from patients, through interviewing. Each student was to have practice in developing the skills of interviewing, professional behavior, providing an open environment, and self-awareness.

"Professional behavior" requires balance between the need to be sufficiently spontaneous, i. e., to have the encounter be genuine, and the need to restrain or mollify one's natural responses for the benefit of the patient (e. g., the doctor can't "go to pieces" over the seriousness of the illness; nor should he react with moral indignation to such problems as venereal disease).

"Providing an open environment" is the ability to create conditions whereby the patient is maximally free to share his thoughts and feelings. "Self-awareness" concerns the capacity to critically look at one's own behavior so that one moves continuously toward a growing repertoire of available and appropriate responses in the professional setting.

In the development of interviewing skill, students were encouraged: first, to become critical observers of a patient's appearance, manner and nonverbal behavior; second, to become listeners sensitive to what the patient says and how he says it; and third, to develop the ability to question patients in a clear and communicative manner.

Although the medical school was reluctant to nominally measure the progress of the doctor-student, a ten question debriefing form was prepared to gauge the success of the doctor-student in the eyes of the patient-actor. (A copy of the form is included as Appendix IV.) Essentially, it asked how comfortable the patient felt with the doctor, the seeming sensitivity of the doctor to the patient's feelings, and the doctor's apparent interest in the problems of the patient. Other questions examined the clarity of the doctor's questions, and whether the doctor provided an open environment, i.e., dealt with the client's problem without intruding his own attitudes, values, and religious, moral or ethical beliefs. Actors were also asked about the perceived competence of the physician and whether or not the patient would choose to return to this physician again if he needed help. The patient responded to these questions by placing a check on a five-step rating scale. The ratings on each of the nine scales were averaged and a mean rating for each doctor computed.

Ratings ran from 5.0, which indicated that a doctor received the highest rating on each of nine scales, to 1.0, which indicated the lowest possible rating on all nine scales. The debriefing forms were completed by the actors at the conclusion of each interview.

Table 6-2, for instance, indicates the way patient 1 rated the seven doctors who interviewed him. The table is useful for assessing the areas of professional competence which led to the doctor's poor showing.

The ratings which doctors received from the patients were normalized so that the ratings could be compared across doctors.

The sample of 37 interactions were coded by three observers. The observers used a sampling interval of three seconds and resolved all disagreements prior to the construction of the interaction matrix.

Only the first five minutes of each interaction were coded for three reasons: First, the opening minutes of the interaction, or initiation stage, is crucial to the development of the rest of the interaction. Patterns of interaction are often established in the initiation stage, and it represents an important key to what will occur in the balance of the interaction.

Secondly, longer interactions would probably be broken down into smaller units of analysis. It is conceivable that the largest

Table 6-2
 Ratings by Patient One of Seven Doctors^a

Debriefing Questions ^b	VII	IV	X	V	VIII	I	II
1. Patient Comfort	5	5	5	4	4	2	1
2. Doctor Comfort	5	5	5	5	2	1	2
3. Doctor Sensitivity	5	5	5	4	5	2	1
4. Doctor Interest	5	5	5	5	5	1	2
5. Question Clarity	5	5	3	4	5	1	4
6. Open Environment	5	5	5	5	4	5	2
7. Nonintrusion of Doctor's Values	5	5	4	5	5	5	5
8. Doctor Competence	5	5	5	4	4	4	2
9. Return to Doctor	5	5	5	4	5	4	1
Mean	5.00	5.00	4.70	4.44	4.30	2.78	2.11
Std. Deviation	0.00	0.00	.67	.50	.94	1.62	1.37

Each cell represents a rating by patient 1 for a given question and a given doctor. 1.00 is the lowest possible rating. 5.00 is the highest. The mean and standard deviation for each doctor is also presented.

^aTables for the two other patients can be found in Appendix V.

^bFull questions can be found in Appendix IV.

unit of interaction time needed for a reliable assessment would be five minutes.

A final reason for limiting the study to the initial five minutes was economic. While VNVIA is not as expensive as some interaction methodologies, the cost for video tape, video tape recording, and interaction coding do encourage selectivity; for purposes of this initial study, short segments of many different interactions seemed more valuable than longer segments of a few interactions.

There were some disadvantages. The five-minute length limits the number of observations to 100 per interview. With 100 observations it is possible to produce an interesting range of 13×13 matrices. However, because of low cell frequencies, statistical comparisons are difficult when comparing complete 13×13 matrices. With 100 observations, the matrices have been collapsed to a 3×3 matrix for block analysis.

FINDINGS

The balance of this chapter is divided into three parts. The first is an analysis of a single interaction matrix selected at random. The purpose of the analysis is to illustrate the kinds of information about a dyadic interaction which can be generated with the aid of the

VNVIA. Included in this section is a minute-by-minute breakdown of the interaction matrix.

Part two reports the result of comparing several groups of paired interactions. The comparisons provide evidence for the notion that there exists a range of interaction typologies.

Part three provides evidence for considering both the interact (dyad) and double interact (triad) in analyzing the data.

Single Interaction Matrix

Consider the interaction matrix in Table 6-3. Through an examination of the interaction pattern revealed by the matrix, it is possible to interpret some of the interaction configurations. The major purpose at this point is not to make concrete statements about what the interaction pattern means, but rather to produce interpretations which could suggest hypotheses for further exploration.

The interaction pattern in Table 6-3 suggests that the patient, through the first five minutes, does most of the talking. The doctor engages in some verbal activity but generally the patient carries the ball. There are few periods of nonverbal interaction. The flow of the interaction is very uniform; the doctor raises questions and the patient answers.

Table 6-3

Interaction Matrix Generated on the Basis of
an Interview Conducted by Doctor Six with Patient One

	Dr. V	Pat. V	NV	Noise	Total
Dr. V	A 9	C 1	E 4	M 0	14
Pat. V	D 1	B 52	F 11	N 1	65
NV	G 4	H 12	I 3	O 0	19
Noise	J 1	K 0	L 0	P 0	1
Total	15	65	18	1	99

When the interview enters periods of nonverbal interaction, the patient usually breaks the silence and begins to talk. The doctor appears to use periods of nonverbal interaction for stimulating patient information production. Generally the patient shows a willingness to respond immediately to oral probes from the doctor.

There is very little interruption. The doctor interrupts the patient only one time. When this occurred, the patient stopped talking and allowed the doctor to state his question or make his comment.

The characteristic flow in the interaction is: doctor questions patient, patient immediately answers, doctor waits, patient responds, offering more information.

An analysis of the interaction cells demonstrates how the interaction pattern described above could emerge from the interaction matrix. By comparing cell B (patient monologue) and cell A (doctor monologue) it is apparent that the patient has engaged in much more verbal monologue than the doctor. The frequency in cell I (nonverbal monologue) is very low. This indicates that the flow of the conversation was regular, i. e., when the doctor finished speaking the patient began, when the patient finished the doctor began. There were few lapses into nonverbal interaction. The frequency pattern in cells A, B, and I seems to indicate a willingness on the part of the doctor and the patient to exchange information.

Cells E (transfer from doctor to nonverbal interaction), F (transfer from patient to nonverbal interaction), G (transfer from nonverbal interaction to doctor), and H (transfer from nonverbal interaction to the patient) are important keys in assessing tolerance for verbal inactivity. To some extent interaction flow and control is a function of tolerance for verbal inactivity. An individual with a low tolerance for verbal inactivity is one who cannot be verbally silent in situations of verbal and nonverbal inactivity. It is difficult

for people to sit together in an interaction and not talk. When a patient has a low tolerance for verbal inactivity, and this is perceived by the doctor, it can be used to pressure the patient into information production. Cells E and F indicate the number of times the interaction moved from doctor and patient verbalization to non-verbal interaction. Cells G and H indicate the number of times the interaction moved from nonverbal interaction into states of doctor and patient verbalization. The high frequency in cell F indicates that patient verbalization was more likely to become nonverbal dialogue than doctor verbalization. This indicates a greater inclination on the part of the patient to respond to verbalizations of the doctor, than the doctor to the verbalization of the patient.

The high frequency in cell H indicates that when the interaction reached a state of nonverbal dialogue, the patient, exhibiting a low tolerance for verbal inactivity, would resume the verbal flow. The doctor, cell G, was much less inclined to do so. One interpretation suggests that, where the patient's tolerance for verbal inactivity is low, the doctor can employ a waiting strategy to elicit greater patient verbalization.

The low but equal frequencies in cells C (transfer from doctor to patient) and D (transfer from patient to doctor) indicate that the number of verbal turnovers were about the same.

The virtually nonexistent frequencies in cells J, K, L, M, N, O, and P indicate the absence of interruption. For the most part the exchange was ordered and pleasant. One interruption was recorded. That was at one point when the patient was speaking and the doctor interrupted, i. e., began speaking at the same time. The frequency transfer from noise to doctor in cell J indicates that as a result of that interruption the doctor managed to take control of the verbalization. This type of a pattern is consistent with the fact that the interchange was polite and that the patient demonstrates a certain respect for the doctor. The doctor, by interrupting and taking over the verbalization, might suggest that he is acting in the role of authority, and exercising his control of the interaction flow.

Matrix totals can also be computed. By adding the frequencies in cells A, D, G, and I, the percentage of doctor verbalization can be calculated. By adding the frequencies in cells C, B, H, and K, patient verbalization can be calculated. Cells E, F, I, and L can determine the amount of nonverbal communication and M, N, O, and P the amount of interruption.

Minute-by-Minute Analysis. Another useful type of analysis

is a minute-by-minute breakdown of the interaction. A comparison of 3×3 matrices generated from the data at every minute provides a means for checking on the evolution of the communication system.

Table 6-4 reports the minute-by-minute breakdown of the interaction in Table 6-3. In Table 6-4 the remainder of the noise categories are not included because nothing is recorded in them.

Table 6-4

Minute-by-Minute Matrix Analysis of an Interaction
Between Doctor Six and Patient One

		Minute One	Minute Two	Minute Three	Minute Four	Minute Five
A	Dr Mono	6	0	0	0	3
B	Pat Mono	3	10	12	19	8
I	NV Int	1	1	0	0	1
C	Dr to Pat	0	0	1	0	0
D	Pat to Dr	0	0	0	0	1
E	Dr to NV	3	0	0	0	1
F	Pat to NV	1	5	3	1	1
G	NV to Dr	3	0	1	0	1
H	NV to Pat	2	4	4	0	3

The interaction begins with the doctor virtually carrying the interview in the first minute. Toward the end of the first minute the doctor indicates to the patient that he expects him to provide information. At this point the doctor completely stops talking. Just after he stops and during the second minute of the interview, the patient is unsure whether the doctor intends to remain silent. The patient provides opportunities for the doctor to speak, but the doctor does not take them. The patient then settles into long periods of talk. During the fourth minute the patient totally dominates the interaction

verbally. Incidentally, it is the only time in the nine interviews granted by patient 1 that this happens.

Finally, near the end of the fifth minute the doctor again becomes involved verbally, either to comment, to ask for a clarification, or to change the direction of the interaction content.

An analysis of cells, Table 6-4, illustrates the interaction evolution described above. The only time the frequency in cell A (doctor monologue) exceeds the frequency in cell B (patient monologue) is in minute one. Also in minute one, notice the relatively high frequency in cell E (transfer from nonverbal interaction to doctor verbalization). The total acculumation of this frequency occurs during the first twenty seconds of the interview. From that point on, except for a time in minute five, the doctor does not talk, following periods of nonverbal interaction. The first time that the doctor indicates he will no longer speak after nonverbal interaction, there is a lull in the conversation for about ten seconds before the patient speaks.

During the second minute the patient provides the doctor with five opportunities to begin verbalizing, indicated by the frequencies in cell F (transfer from patient verbalization to nonverbal interaction) minute two. The doctor takes none of them, frequency in cell G (transfer from nonverbal interaction to doctor verbalization) minute two.

The increase in patient verbalization is apparent from the frequencies in cell B (patient monologue) minutes two, three, and four. The frequency in cell A (doctor monologue) minute five, is the result of the doctor re-entering the interaction verbally. That does not happen in the interaction until approximately 45 seconds into the fifth minute.

Each interaction matrix lends itself to a similar type of analysis. Many different interaction patterns emerge. However, in some cases the interaction patterns are strikingly similar. It is possible that interactions which produce similar maps belong to the same family or class of interaction. These classes or typologies are discussed in the next section.

Interaction Typologies

In considering interaction typologies it is important to establish some relationship between the interaction matrix and some dependent variable. In this particular study the dependent variable is the patient's judgment of interaction success. Success here is defined in terms of patient satisfaction.

If, in a series of interaction matrices, the changes from one matrix to another are systematically related to the changes in a patient's ratings of those interactions, it is reasonable to assume there is some correspondence between the matrix pattern and the interaction rating.

Consider in Table 6-5 and 6-6 the interaction matrix cells of patients 1 and 3 generated from a series of interviews which they granted.

Notice that in Table 6-5, as the patient's ratings increase, certain trends are apparent in the various major blocks of the interaction matrices. For example, as the patient's rating increases, the amount of doctor verbalization decreases and the amount of patient verbalization increases. Other trends are apparent in non-verbal dialogue and transitions from the nonverbal mode to patient verbalization. A similar trend can be seen in other cells. Higher ratings seem indicative of interactions where there is little concern on the part of the doctor to pick up verbally after periods of nonverbal dialogue.

There is no foolproof way of checking the strength of the relationship in Table 6-5 between matrix trends and dependent variables. As indicated in Chapter V, one of the major assumptions of the chi square model is that interactions under consideration must be independent. The interaction matrices in Table 6-5, because they represent interactions granted by one patient, are not independent and, therefore, should not be compared. Until a model is mathematically tested, relationships of the type found in Tables 6-5 and 6-6 cannot be statistically checked.

Table 6 -5

Summary of Seven Interaction Matrices Generated from
a Series of Interviews Granted by Patient One

	Doctors							$\sum X$	$\bar{X}$	S.D.
	II	I	VIII	V	X	IV	VII			
A (Dr Mono)	14	13	12	14	9	0	1	63	9.00	5.16
B (Pat Mono)	6	2	9	7	24	20	44	112	16.00	13.58
I (NV Int)	37	47	23	35	25	28	10	205	29.29	10.92
C (Dr to Pat)	3	1	3	1	3	3	3	17	2.43	.90
D (Pat to Dr)	2	0	3	2	3	1	4	15	2.14	1.25
E (Dr to NV)	9	9	8	8	4	1	1	40	5.71	3.37
F (Pat to NV)	10	7	15	12	12	20	16	92	13.14	3.95
G (NV to Dr)	9	9	7	7	6	2	0	40	5.71	3.20
H (NV to Pat)	9	7	15	13	11	18	18	91	13.00	3.96
Patient Rating	2.1	2.8	4.3	4.4	4.7	5.0	5.0			
1-4	25	23	23	23	18	4	5			
5-8	18	10	27	21	39	43	66			
9-12	56	65	47	55	41	49	27			

Table 6-6

Summary of Ten Interaction Matrices Generated from
a Series of Interviews Provided by Patient Three^a

	Doctors										$\sum X$	$\bar{X}$	S. D.
	II	VI	XII	I	IV	III	XI	VII	VIII	IX			
A (Dr Mono)	9	9	23	10	4	11	2	2	4	5	79	7.90	10.40
B (Pat Mono)	60	61	37	58	57	57	68	73	75	51	597	59.70	10.44
I (NV Int)	2	3	1	3	1	1	1	3	2	1	18	1.80	.87
C (Dr to Pat)	5	3	8	2	7	9	5	5	4	4	52	5.20	2.09
D (Pat to Dr)	5	2	9	5	5	5	3	1	3	4	42	4.20	2.09
E (Dr to NV)	1	2	3	4	1	2	0	0	0	1	14	1.40	1.28
F (Pat to NV)	5	5	3	3	4	4	8	6	4	7	49	4.90	1.58
G (NV to Dr)	2	4	3	2	3	6	3	4	1	1	29	2.90	1.44
H (NV to Pat)	5	5	3	6	3	1	5	3	4	8	43	4.30	1.84
Patient Rating	1.9	1.9	2.8	3.1	3.4	4.0	4.0	4.3	4.4	4.8			
1-4	17	15	36	17	14	22	8	7	8	11			
5-8	71	71	50	69	72	69	80	82	84	69			
9-12	8	11	8	10	6	7	9	9	6	10			

^aThe summary of interaction matrices generated from a series of interviews granted by patient two, and conducted by three doctors can be found in Appendix VI.

A close investigation of Table 6-6 indicates a lack of correspondence between the ratings of patient 3 and trends in the interaction matrix cells.

One conclusion is that the dependent variable in the case of patient 3 does not have as strong a linear relationship to the quantification of the interaction generated by the VNVIA as does the interactions of patient 1. In other words, the VNVIA might not be sensitive to the elements utilized by patient 3, in making his judgment of interaction success.

In the case of patient 1 there appears to be some correspondence between the evaluation of the interview and the VNVIA interaction matrix. When a correspondence exists, it is possible to describe those aspects of an interaction which have led to the judgment of the interaction.

Successful-Unsuccessful Matrices Related to One Patient.

In Table 6-7 two interaction matrices are present. Both represent interactions in which patient 1 participated. One (II-1) was given a low rating (2.1) by patient 1. The other (VII-1) was given a high rating (5.0). By comparing the two interaction matrices it is possible to isolate those dimensions of the interaction, quantified by the VNVIA, which patient 1 believes to be important for successful and unsuccessful interactions.

Before comparing the interaction matrices, it is useful to know that patient 1, in a series of written comments made at the conclusion of the interview, said that interaction VII-1 was a successful one because the doctor showed he cared about him. The patient indicated that the doctor had given him sufficient time to express his own ideas. The other (II-1) was not satisfying because "the doctor was only interested in my physical problem and not in me as an individual." The interaction matrices below support these comments.

Table 6-7

Two Interactions Granted by Patient One.
One Represents a Successful Interview,
the Other an Unsuccessful Interview

VII-1 Successful					II-1 Unsuccessful				
Dr. V		Pat. V		NV	Dr. V		Pat. V		NV
Dr. V	A	C	E	1	Dr. V	A	C	E	9
	1	3				14	3		
Pat. V	D	B	F	16	Pat. V	D	B	F	10
	4	44				2	6		
NV	G	H	I	10	NV	G	H	I	37
	0	18				9	9		

The pattern in the successful interaction reveals that the patient verbally dominates the interaction. The doctor who demonstrated a reluctance to speak used periods of nonverbal interaction to entice the patient into long periods of verbalization. The matrix cell analysis clearly supports this interaction pattern.

The low frequency in cell A (doctor monologue) suggests an absence of doctor verbalization. The high frequency in cell B (patient monologue) and the fairly low frequency in cell I (nonverbal interaction) suggest that the patient is eager to verbalize and does not allow the interaction to fall into long periods of nonverbal interaction. The frequency in cell H (transfer from nonverbal interaction to patient verbalization) indicates that when the interaction lapses into states of nonverbal interaction, it is the patient who initiates the verbalization, not the doctor, as indicated by the zero in cell G (transfer from nonverbal interaction to doctor verbalization). The interaction is characterized by a silent doctor who allows the patient the freedom to express himself as he chooses.

The interaction pattern of the unsuccessful interview reveals that the doctor verbally dominated the interaction. The patient was reluctant to talk. This reluctance, coupled with the doctor's strategy to wait for the patient, led to lengthy periods of nonverbal interaction. The transitions between doctor and patient verbalizations

were very slow. Most of the doctor's questions and patient's comments were followed by periods of nonverbal interaction. The matrix cell analysis illustrates this interaction pattern.

The high frequency in cell A (doctor monologue) indicates a moderate amount of doctor verbalization. The low frequency in cell B (patient monologue) and the high frequency in cell I (nonverbal interaction) indicate a lack of patient verbalization. This lack of patient verbalization leads to long periods of nonverbal interaction. The frequencies in cells G and H (transitions from nonverbal interaction to doctor and patient verbalization respectively) indicate that the nonverbal interaction is broken by the doctor and the patient in equal amounts. The interaction is characterized by some lengthy periods of doctor verbalization, few instances of patient verbal monologue, and a great amount of nonverbal dialogue. In comparison with the successful interaction, the output of verbal information on the part of the patient is severely reduced.

When a relationship has been established between some dependent variable and the VNVIA, as in the case of patient 1, it is possible to determine whether an interaction pattern is universally related to a series of similarly rated interactions. For instance, if, in comparing a series of interactions rated high by a group of patients, it is found that the matrices look very much alike, it is

possible to make some statements about the matrix pattern of most successful interactions.

The data included a number of interaction matrices which showed a relationship to the dependent variable. These matrices were generated from a number of interviews conducted by several doctors and a range of patients. In each case the patient rating of the doctor was similar.

Moderately Successful Interactions Related to Two Patients.

In Table 6-8 the matrices of two such interactions are presented.

The patient rating of interaction II-6 was 2.5. The patient rating of interaction III-7 was 2.8. The similarity of the interaction matrices is evident.

Table 6-8

The Matrices of Two Interactions Rated by Patients
as Moderately Unsuccessful

Matrix II-6					Matrix III-7				
Dr. V		Pat. V		NV	Dr. V		Pat. V		NV
Dr. V	A	C	E		Dr. V	A	C	E	
	23	7	8			19	2	17	
Pat. V	D	B	F		Pat. V	D	B	F	
	2	9	7			2	7	6	
NV	G	H	I		NV	G	H	I	
	14	2	23			17	7	20	

The interaction patterns are characterized by moderate amounts of doctor verbalization, small amounts of patient verbalization, and a moderate amount of nonverbal dialogue. The matrices indicate that the doctors are eager for information and the patients are reluctant to give it (buildup in cell I). The doctors have little tolerance for verbal inactivity (substantial frequencies in the G cells). The patients, on the other hand, show a high tolerance for verbal inactivity (fairly low frequencies in the H cells).

Two Successful Interactions with Different Matrix Patterns.

When checking a series of interactions related to a dependent variable in a similar way, it is not surprising to find that their interaction patterns differ. This lack of correspondence between two interactions rated similarly produces interesting grounds for speculation. Consider the two interaction matrices in Table 6-9.

The patient rating of interaction matrix IV-1 was 5.0, the highest possible. The patient rating of interaction matrix I-6 was 4.7. A close examination reveals that the two could not be more opposite.

One explanation suggests that some patients prefer different interaction patterns. These different interaction patterns can serve as a basis for differentiating between interaction typologies. For example, the patient in interaction IV-1 prefers those interaction

situations where the doctor verbalizes very little, while the patient in interaction I-6 prefers those interactions where the doctor does most of the talking. In interaction IV-1 a constant flow of verbalization is not preferred (frequencies in cell I), whereas in interaction I-6 it is.

Table 6-9

The Matrices of Two Interactions Rated by the Patients
as Successful

Matrix IV -1					Matrix I-6				
Dr. V		Pat. V		NV	Dr. V		Pat. V		NV
Dr. V	A	C	E		Dr. V	A	C	E	
	0	3	1			50	5	7	
Pat. V	D	B	F		Pat. V	D	B	F	
	1	20	20			4	16	2	
NV	G	H	I		NV	G	H	I	
	2	18	28			7	2	4	

When other aspects of the interaction are studied, other differences become apparent. In interaction IV-1, for example, the patient is concerned about a problem he has now. In I-6 the problem could occur sometime in the future and has a low probability of occurring. The doctor in IV-1 is extremely easy-going and relaxed. He has good control, can tolerate verbal inactivity and is concerned

about projecting a certain level of understanding and competence. The patient in interaction IV -1 exhibits a reluctance to talk about his problem, but does so when the doctor, through his quietness, shows his concern for the difficulty of the situation the patient must talk about. The patient in interaction I-6 needs to feel the doctor is competent. She answers most of the doctor's questions with questions of her own. The doctor, sensing that the patient needs the security a doctor can bring, launches into many long answers, including many details.

These differences suggest that an interaction matrix generated by the VNVIA can be a useful way to talk about interaction typologies and perhaps lead to the classification of typologies on the basis of other interaction variables.

Dyads and Triads

The VNVIA, as it has been developed thus far, uses as its basic unit of analysis the dyad or interact. An interact was previously defined as any action followed by some reaction. A communication system state in which communicator one was silent while the other talked and moved, followed by a communication system state in which communicator one remained silent while the other stopped talking and continued moving, would constitute an interact within the VNVIA framework. These interacts are the units plotted into the interaction

matrix, and when taken together create a map of the substructure of the interaction.

The data generated by the VNVIA can be viewed in another way. Rather than focusing on the dyad, or interact, it is possible to isolate a triad or double interact. The double interact is produced by a sequence of events in which any action receives an immediate response, and in return elicits a new response on the part of the organism creating the initial action.

Consider the following application of the double interact in communication. Individual A is communicating verbally with individual B. Individual B, desirous of inserting an idea into the flow of the conversation, signals to A, using a nonverbal code. If A perceives the signal and understands it, he may relinquish control of the verbal band.

The triadic analysis can provide important information about communication flow. In terms of the VNVIA, the recurrence of the sequence of interaction states 1, 3, 5 creates quite a different interaction profile than the recurrence of the interaction sequence 1, 3, 4.

Sequence 1, 3, 5 describes an interaction situation in which at T_1 communicator one is verbally active and nonverbally silent while communicator two is both verbally and nonverbally inactive.

At T_2 communicator one continues to be verbally active and nonverbally silent. Communicator two, still verbally silent, now becomes nonverbally active. At T_3 , according to sequence 1, 3, 5, communicator one, responding to the nonverbal activity of communicator two, becomes verbally and nonverbally silent, while communicator two becomes verbally active and nonverbally silent. The 1, 3, 5 sequence illustrates a communication situation in which communicator one is sensitive to, and willingly complies with the nonverbal communication of communicator two.

The opposite would be true in an interaction where the predominant triad was 1, 3, 4. Here, rather than yielding to communicator two, communicator one, employing the nonverbal band himself, overrides the incoming nonverbal signal, moving to a state where he is active in both the verbal and nonverbal band.

Triadic analysis has some interesting possibilities. However, it is important to recognize that until continuous coding is more fully developed, a rigorous application of triadic analysis is not encouraged. In triadic analysis it is necessary to deal with reactions and responses which are immediate. This is particularly true of signs in the nonverbal band, which are often instantaneous and fleeting. Moving to a means of continuous coding will help alleviate the problem of the analysis interval.

One major advantage of triadic analysis is that it pushes the investigator to consider the nonverbal semantic dimension.

Triadic analysis requires that specific types of nonverbal behavior be identified. For example, it is important to know whether the nonverbal behavior recorded as part of code 3 is in fact a sign from communicator two that he desires to speak and not a movement of discomfort, or a movement totally out of awareness. When isolating a number of 1, 3, 5 sequences in an interaction, it is important that the type of nonverbal behavior recorded in each represents a particular class of signal.

Through the identification of these nonverbal behaviors, a new dimension is added to the VNVIA which allows for making better predictions about the direction of the interaction evolution, and about increasing of information about the structure of dyadic communication.

CHAPTER VII

SOME FUTURE DIRECTIONS

The findings reported in Chapter VI suggest that the VNVIA is a viable methodology for providing new insights into the process of dyadic communication. As developed thus far, the VNVIA provides researchers with an opportunity to explore a new range of communication questions. Usually the kinds of questions suggested by a new methodology are not of equal value. Some provide more crucial information about communication and must be dealt with immediately. Others can be detained until later. The present chapter attempts to single out those emerging issues which should be treated first.

Chapter VII is divided into three sections. The first suggests some directions for future research based on the findings generated during the initial application of the VNVIA. The second suggests some ways the methodology can be further developed and improved. Through continued development the VNVIA can be applied in answering questions of a more extended range. Section three

illustrates some of the practical information generated by the VNVIA as it now exists.

ANALYSES SUGGESTED BY INITIAL DATA

Interaction Structure

Because the methodology does not directly quantify message content, there is some reason to suspect that the data is content free. Data would be content free if the verbal and nonverbal message content were independent of the interaction profile or the interaction matrix. However, evidence gathered during the reliability tests indicates that message content is not independent of the interaction pattern. The relationship implies that the VNVIA is not content free, but rather content ignoring, i. e., does not code content directly but rather some behavior which is content relevant.

This view suggests that the data generated by the VNVIA, though not completely free from the interaction message, represents a degree of separation from content previously not attainable in the study of dyadic interaction. This separation is important because it provides an opportunity for studying the structure of interaction systems. There are essentially two types of interaction structures.

The first is a basic structure which permeates both message content and interaction content. It is the type of structure which

corresponds to certain basic dimensions in interpersonal relationships. For instance, we might expect that there exist some interpersonal similarities in those communication systems involving an expert and client which serve to govern the emerging interaction pattern. Given a large enough sample of expert-client interactions, the VNVIA should reveal the basic structure of this type of communication system.

The second level is more superficial. Here the interaction structure is changed as a result of influences from message content and interaction context. Consider the following example in which message content has an influence on the evolving interaction pattern.

A patient comes to a doctor for help because he is afflicted with venereal disease. When the interaction begins, the doctor, utilizing a very indirect interview strategy, allows the patient to talk on any topic. The patient, given the opportunity, begins talking animatedly about various student movements and of his role in a number of campus protests. The patient appears relaxed and is eager to talk about his many personal views.

After several minutes the doctor, attempting now to bring the discussion around to the patient's problem, tactfully changes the topic of conversation. This change immediately affects the patient's behavior. His desire to verbalize and his general state of animation suddenly cease. For the next several minutes, the patient sits mute

and relatively inactive. The only perceptible movement in the patient is the nervous fingering of a ball point pen.

In this example the change of topic is unquestionably linked to the flow of communication, and the flow of communication is directly related to the emerging interaction pattern.

It is also possible to witness the influence of interaction context on changes in interaction pattern. The social context can be a force in changing the interaction pattern. While the context alone cannot be totally responsible for any emerging interaction pattern, there is reason to suspect that the contextual dimensions have the potential to alter or subdue the interaction's basic structure.

This view suggests that the physical setting in which the communication occurs and the relationship between interactants have some effect on the interaction pattern of two individuals discussing a similar message topic. For example, the interaction pattern generated from an interaction between a lawyer and a client about the testimony of a witness in the courtroom would be different than the interaction pattern between the same lawyer and client discussing the same topic in a bar during a court recess. The major assumption here, of course, is that individuals are motivated to engage in particular kinds of behavior at certain times and places. What is acceptable behavior in a courtroom is not in a bar and vice versa.

Questions about the effects of basic structure on emerging interaction patterns, and about the influence of content and context for altering that structure, must be understood if we are to learn more about the meaning of the interaction matrix. Two approaches might be suggested.

Wider Interaction Range

One way to learn about the basic structure of an interaction is to isolate a wide range of specific types of interactions. The expert-client dyad is one major type. Others might include interactions between parents and children, between teenagers and between husbands and wives. Another possibility would be to break down expert-client interaction into types such as teacher-student, doctor-patient, or psychiatrist-client.

Basic structure could also be related to types of interaction situations. For instance, a different basic structure might emerge when the interaction is one involving problem solving as opposed to conflict resolution.

Large Samples

A beginning step in the analysis of the influence of content and context on the interaction pattern would be to search through a

large sample of interactions which represent a particular population, e.g., doctor-patient interaction. Utilizing methodologies in content analysis, it is possible to isolate contextual elements and bits of content, e.g., topics of conversation or types of verbal probes, which consistently and systematically influence dyadic interaction.

For instance, within the message content area it is possible to explore the degree to which threatening message topics may influence interaction patterns. Other message content categories might include question clarity, topic relevancy, intrusion of morals, and utilization of medical jargon.

At the nonverbal message content level, it would be possible to isolate the utilization of types of nonverbal behavior. The kinds of facilitation, amount of eye contact, and utilization of affect displays could be important keys in the emerging communication pattern.

Once certain variables have been isolated, the VNVA can be used as a dependent measure for determining whether certain interaction patterns can be produced by controlling some variables and manipulating others. Initially it might be most productive to study interactions where the behavior of one interactant is controlled. By training a confederate to behave according to some prearranged pattern, using only certain kinds of gestures and body movements and a restricted range of topics, a researcher could determine the

impact of certain kinds of verbal and nonverbal content on the interaction patterns.

Likewise the context of the interaction could be changed for studying the effects of the interaction situation on the emerging pattern.

Dependent Measures

Another line of research might concern itself with the investigation of the relationship between interaction patterns and other dependent measures. Dependent variables which should receive initial attention are those concerning the way interacting individuals perceive the interaction situation. Measures related to the perception of interaction fruitfulness from each interactant's point of view are particularly important. For instance, it would be important to establish whether both individuals had similar feelings about an interaction. Perhaps to the doctor a fruitful interaction might be one in which he was able to amply illustrate his competence as a doctor. He might accomplish this by engaging in long periods of verbalization using medical jargon and detailed problem analysis. On the other hand, to the patient a fruitful interaction might be one where he has the latitude to talk at length about a range of topics with which he is most comfortable.

These examples illustrate differences which would be reflected in the interaction patterns. Similar application could be made in areas concerning the control of the interaction or levels of information production.

The VNVIA itself can be used to generate a wide range of dependent measures. In Chapter III indices were generated by relating two aspects of an interaction matrix. For example, the ratio between patient verbalization and doctor verbalization may give some indication of interaction productivity. This productivity ratio could be important in testing for the utilization of a particular type of interview strategy. For example, one widely held interview strategy is "the funnel." In this approach, the doctor begins the interview by asking questions of a very general nature. They are short and designed to encourage the patient to talk. The doctor, once the patient is verbalizing freely, begins to narrow the range of topics by asking questions of a more specific nature. As his questions become more specific, they become longer. The patient, on the other hand, needs to verbalize less. In fact, late in the interview, much of the patient verbalization is limited to a single yes or no response.

The use of the "funnel strategy" can be confirmed by plotting the productivity ratio. If the productivity ratio is high during the

initial stages of the interaction, and then it drops off as the interaction progresses, we might assume the doctor is employing a "funnel strategy."

Testing Theory

A major use to which the VNVIA can be put is in the further testing of existing behavioral theory. The VNVIA can be employed at two levels. At one level the interaction matrix serves as a summary or map of the entire interaction. This map can be compared with maps of other interactions and communication differences discussed.

Such a use is apparent in the testing of theory in the broad area of classroom climate. Based on theory which has developed around questions of direct and indirect teacher guidance, or democratic-authoritarian control, it is possible to predict and test hypotheses related to emerging interaction patterns. Classroom climate theory based on indirect and direct methods of teaching indicates a rationale for expecting certain types of interaction patterns to emerge. Two interaction maps, one generated from a teacher-student interaction based on indirect methods and another generated from a teacher-student interaction based on direct methods, should reveal differences in interaction patterns.

One type of application would be to verify whether the emerging teacher-student interaction pattern was consistent with what the teacher believed to be his interaction behavior.

At another level, interaction matrices can be generated throughout the evolution of one interaction. This approach would make it possible to check on interaction changes as they occur through time.

At this level the VNVIA can be utilized to test notions developed from theory in small group (two person) problem solving. Two kinds of activity in small groups may account for differences in interaction patterns. One concerns interaction maintenance. During periods of maintenance, interactants deal with establishing the rules which will govern the interaction. Once these rules have been established, the interactants can settle down to attack their mutual problem.

In Chapter VI the minute-by-minute breakdown of one interaction matrix illustrates some of the differences one might expect over time in the dyadic problem solving interaction. The initial minute of the interaction is spent defining the relationship between the interactants and establishing the ground rules on which the interaction will proceed. The interaction pattern which emerges during this minute is very different than that which emerges in the next

three. One reason for the change could be attributed to the movement from a maintenance stage to a problem solving stage.

There are many behavioral theories which suggest differences in the type of verbal-nonverbal interaction pattern. The VNVIA now provides a way for quantitatively testing some communication behavior based on those theories.

Markov Chains

It was mentioned briefly in Chapter V that the VNVIA is a methodology which represents a Markov chain. This leads to some interesting notions about predicting the development or evolution of an interaction. In a Markov chain the probability of the next event in a series of events is a function of everything which has gone before. This suggests that a probability matrix constructed from the total matrix of an interaction allows for predicting, with accuracy, the occurrence of some future state based on those states previously specified.

It is difficult to go beyond this simplistic theoretical state because Markov chain analysis is a complex statistical method. For the individual with the ability to understand Markov, the VNVIA provides an opportunity to predict future states of interaction systems.

EXPANDING THE VNVIA METHODOLOGY

Continuous Coding

In the initial application of the VNVIA, a three-second interval sample was used. There is some evidence (Chapter IV) which suggests that the three-second sample is a representative sample of the interaction pattern of any one interview. If the total interaction pattern or map is sufficient for any particular analysis, the three-second sample is the easiest, quickest, and most economical way to proceed.

If, however, it becomes necessary to analyze the movement from one interaction state to another, as with triadic analysis, it is imperative that the interval between interaction states be reduced.

Here the research question is linked to problems involving assumptions about whether interaction states follow one another directly or whether there are some states, not recorded by the sampling methods, which intervene. One way to assure that the assumption is met would be to decrease the interval size. At present, the only way to decrease size is through the employment of continuous coding.

Outside of an equipment limitation, which, although costly, far more inexpensive than most mechanical systems, the problems

with continuous coding are the development of programs for training observers and a more vigorous testing of the approach relative to the paper and pencil three-second interval method.

The most difficult aspects of observer training are response latency and response direction. Regarding response latency, it is important to work with observers so that they completely eliminate response latency or reduce it to some systematic interval. The problem of a systematic interval may be a function of training time and category familiarity. The most discouraging aspect of the experimentation with the event recorder (Chapter IV) was the variability in response latency.

The problem of response direction is more easily solved. During the experimentation with the event recorder, observers reported on two occasions that during a very rapid sequence of non-verbal activity and inactivity they could not remember whether a press downward meant activity or inactivity.

There is evidence to suspect that the preliminary experiment with continuous coding, in which there was one rather discrepant result, was the result of an observer training problem. There is also some indication that there is less of a problem coding verbal activity than nonverbal. The discrepant result reported in Chapter IV was traced to coding the nonverbal band.

Generally there should be a close correspondence between the results generated by the three-second interval method and the continuous method. Before the continuous method of coding is utilized there must be further testing to establish correspondence between methods.

The advantage of continuous coding is that the interval between interaction states can be reduced, increasing the correspondence between them.

Nonverbal Behavioral Categories

One restriction of the VNVIA is its inability to differentiate or distinguish types or classes of nonverbal behavior. This restriction is most strongly felt when moving toward the triadic analysis or other higher forms of analysis where the nonverbal semantic dimension becomes important. If, for instance, in triadic analysis, an investigator desires to make a statement about whether nonverbal activity is being utilized by one communicator to regulate the verbal interaction flow, it is important to specify whether the nonverbal activity was actually intended to regulate the interaction flow. In other words, at some point it becomes necessary to distinguish between classes or categories of nonverbal behavior. Along with the ability to make certain distinctions, researchers will be provided

with increased amounts of information and with the ability to ask questions of a very specific nature. In terms of extending the present VNVIA, developing the capability to distinguish classes of nonverbal behavior has a high priority.

Some progress has already been made. Ekman and Friesen (1970) have developed a scheme for distinguishing between classes or types of nonverbal behavior. They have identified five categories of nonverbal behavior, emblems, illustrators, regulators, affect displays and adaptors.

(1) Emblem. This serves a specific communication function. An emblem is a nonverbal behavior which can be replaced by a word or phrase. The hand configuration in which the thumb and pointer finger meet forming a circle stands for the word "all right." Emblems are specifically taught as verbal language is taught.

(2) Illustrators serve as a helping function for verbal communication. Illustrators are directly tied to speech and assist by helping to clarify message content. Rhythmically pounding the table with a fist while driving home a point verbally is an example of an *illustrator*. For the most part illustrators are learned by imitation in social situations. Because they are learned socially, the type of *illustrators* and frequency with which they are utilized differ from culture to culture.

(3) The function of a regulator is to guide the flow of an interaction. A postural shift by one communicator in an interaction is one way of suggesting that he has something to contribute to the conversation and desires to speak. Regulators are overlearned habits which are produced by individuals almost involuntarily.

(4) Affect displays are produced by the muscles of the face, which is the primary channel for the nonverbal communication of emotion. Affect displays are linked with verbal affective statements and can repeat, augment, contradict, or be unrelated to them.

Affect displays are usually not intended as communication, but many times turn out to be. The origin of affect displays is traced to a relationship between facial musculature and affect. A serene countenance is an affect display for an internal psychological state of calm.

(5) Adaptors refer to a class of nonverbal behaviors which are initially learned as part of the socialization process, i. e., combing or fixing the hair before appearing in public. A nonverbal behavior is an adaptor if a learned behavior, hair combing, for example, is triggered by a verbal behavior outside the context in which the nonverbal behavior is

normally performed in the bathroom or bedroom. Adaptors are rarely intended to communicate.

By using these categories as part of or in conjunction with the VNVIA, a wide range of questions can be asked. For instance, by isolating nonverbal behaviors in the regulator category, it is possible in a triadic analysis to learn if regulators are perceived, and if so, whether the communicator chooses to override them. With this information it becomes possible to study the effects of inhibiting participation in terms of the evolution of an interaction pattern.

Another type of study involves the effects of variation in classes of nonverbal behavior and patterns of interaction.

Mechanical Analysis

Once the semantic dimensions of the interaction patterns are known, i. e., when it is possible to suggest concrete changes in interaction strategy based on the typography of the interaction matrix, it will be useful to have a method of coding and processing which is free from human judgment and produced instantaneously.

With the advent of the voice key and the oscilloscope, it is possible to electronically code communication band activity.

Machine coded interviews reduce coding errors, allow for handling

split-second intervals, and arrange the data for immediate processing and instantaneous matrix generation. With the help of electronic equipment and the proper computer programs, it is possible to construct interaction matrices for use in consultation within minutes of the end of an interaction.

Computer analysis can be fruitful in other ways. Following the construction of a chi square program for Markov chains, statistical comparison of matrices or groups of matrices will be greatly facilitated. Other programs can be constructed for pulling out and making frequency counts of both the dyads and triads which comprise the interaction pattern.

INFORMATION GENERATED BY THE VNVIA

As it now exists, the VNVIA provides researchers with an opportunity to investigate a new aspect of dyadic interaction. Until now there had been no empirical methodology for quantifying communication band utilization. After applying the VNVIA to a limited number of doctor-patient interactions, several general statements can be made about doctor-patient interviews.

It was not an uncommon occurrence for patients to become verbally inactive when doctors began to explore the dimensions of their physical problems. At those times the doctor who could wait

during the patient's long silences or periods of verbal and occasionally nonverbal inactivity, elicited more verbal information than the doctor who could not. The former situation seemed to occur more frequently in interactions where doctors exhibited practically no nonverbal activity, and the nonverbal behavior of the patient was strongly in evidence. When doctors were engaged in nonverbal activity, even though verbally inactive, they had less success stimulating the patient to verbal activity. Generally doctors had more trouble getting patients engaging in little nonverbal activity to become verbally active than those patients who were nonverbally active.

There seems to be a link between the rating of interaction success and verbal activity. Patients generally gave higher ratings to doctors in interactions where the patients talked the most. Doctors who were able to wait for verbally inactive patients, thereby inducing information production, were rewarded by their patience.

There are other aspects of doctor-patient interactions which become apparent after applying the VNVIA. Those above are some of the most obvious. How these dimensions of doctor-patient interaction can be applied to all doctor-patient interviews is difficult to say. Generally, they seem to hold for the population of interviews out of which the sample of 37 was drawn.

On another level, doctors can gain information about their own performance. In some cases the interaction matrix from one interview can be compared to that of another. From a comparison a doctor can determine the way patterns of verbal and nonverbal activity change from interview to interview. He can also relate certain personal feelings of interaction success against the interaction pattern. To know, for instance, that a great deal of doctor nonverbal activity has a detrimental effect on interaction success is an important bit of information.

Some doctors, aware that certain interview strategies produce certain interaction patterns, can utilize the interaction matrix as a check on whether certain goals were accomplished. For example, a doctor using an indirect strategy would be annoyed if the interaction matrix indicated a large amount of doctor verbal activity. Other kinds of checks which the doctor could make include his amount of nonverbal behavior as an indication of personal anxiety, his level of inactivity tolerance as an indication of personal and interaction control, and his behavior during periods of noise or interruption. If the patient yields to the doctor when the doctor interrupts, it is one indication to the doctor that he is in an interaction relationship most conducive to optimum doctor-patient interactions.

The preceding analysis indicates that even though the VNVIA is not without some limitations, it has the potential for providing some new information, and raising some interesting questions in the area of dyadic communication. The thesis has shown that the VNVIA is a viable tool for quantifying the activity dimension of dyadic communication systems. As an instrument, its reliability is adequate. It is relatively easy and economical to use and the data it generates have significance from both a theoretical and practical point of view. At present, a number of fuller tests are in order. With continued modification and increased applications, many questions in the general area of dyadic communication may be answered by the VNVIA.

APPENDICES

APPENDIX I

MATRIX GENERATION FORM

The matrix generation form is used for converting an interaction data sequence into the interaction matrix. Data units are considered in pairs. For example, given the data sequence 2, 2, 1, 6, 6, 2, the first tally in the matrix would be placed in the matrix square formed by row 2, column 2, with the row number entered first. The second tally in the matrix would be placed in the matrix square formed by row 2, column 1; the third in the matrix square formed by row 1, column 6; and the fourth in the matrix square formed by row 6, column 6.

APPENDIX I

MATRIX GENERATION FORM

[illegible]

APPENDIX II

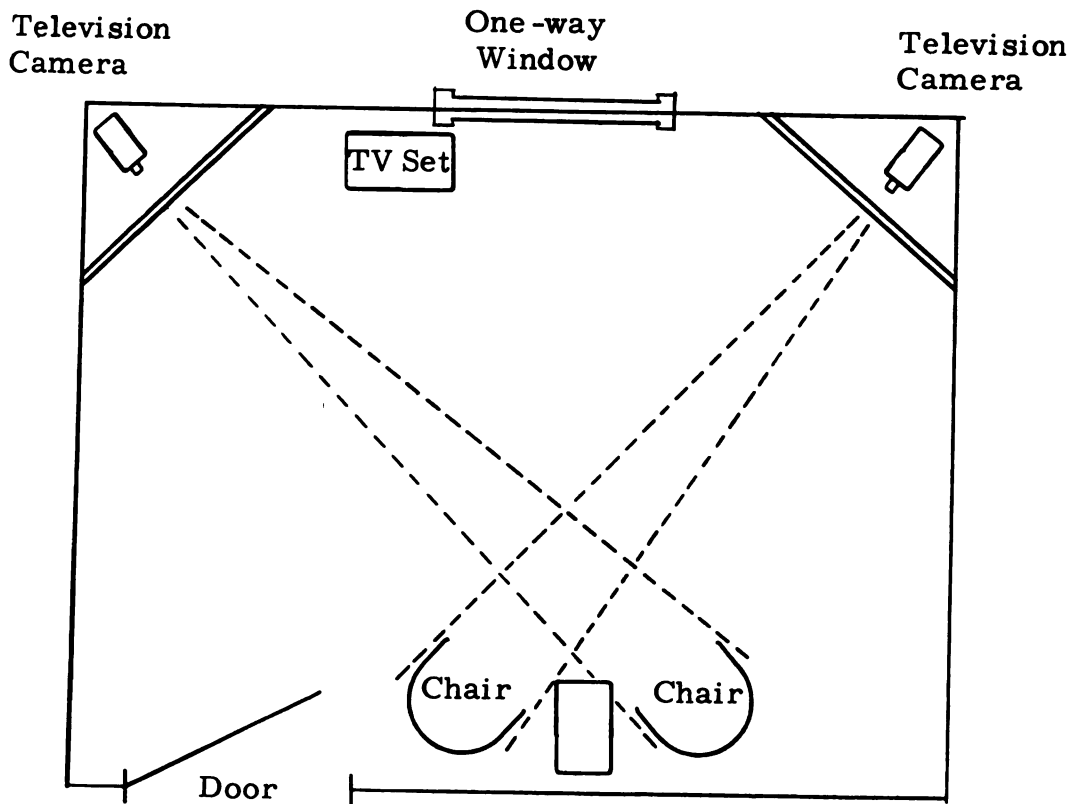
INTERVIEW ROOM DIAGRAM

The College of Human Medicine utilized two similarly equipped rooms to videotape the doctor-patient interactions. Each room contained two small videcon cameras, a TV set, several comfortable chairs, a small table and lamp, and the potential for outside viewers to watch the interaction through a one-way glass. The room diagram on the following page is not accurately drawn to scale. It does, however, fairly represent the placement of furniture and television cameras.

The television signal was transmitted to a control room where, through a split-screen technique, the pictures were combined in one frame. This split-screen picture was transmitted to a receiver in a small room adjoining the interview room, where other medical school faculty could observe.

APPENDIX II

INTERVIEW ROOM DIAGRAM



APPENDIX III

OBSERVERS' SCORE SHEET

The score sheet was set up to handle interactions five minutes in length, utilizing a three-second sampling interval. Each column on the score sheet represents one minute. Each cell represents one three-second interval.

Observers would listen for the 600 Hz tone in the audio track of the video tape. When it sounded they would observe, for one interactant and one communication band, whether activity had occurred at the tone. If activity was perceived, a vertical line (|) was placed in the cell corresponding to the tone. If no activity was perceived, a zero (0) was placed in the cell.

Every fifth tone was a bit more intense than the others. Introducing a loud tone at specified times helped the observers to stay in synchronization. It also served as a check on whether or not tones were missed.

APPENDIX III

APPENDIX IV

ACTOR DEBRIEFING FORMS

The actor debriefing form was constructed from the criteria set forth by the College of Human Medicine as part of the doctor-patient relationship course. Actor-patients were asked to rate the doctor who interviewed them. This was done immediately after the completion of the interview. The ratings were used as an independent measure of interaction success.

Form I was the first form used to collect the opinions of patients. After using form I, some patients indicated that their opinions changed during the course of the interaction. Form II was constructed to provide patients with the opportunity to indicate the direction their opinions changed. However, after the form was put into use, none of the patients took advantage of indicating a change of opinion.

ACTOR DEBRIEFING

Actor Code: _____

Form I

Student Code: _____

We are interested in your feelings and observations about the interview you just experienced.

1. How comfortable did you feel during the interview?
Extremely comfortable: __:__:__:__:__:Extremely uncomfortable
2. How comfortable did your doctor-interviewer seem?
Extremely comfortable: __:__:__:__:__:Extremely uncomfortable
3. How sensitive was the physician to your feelings?
Extremely sensitive: __:__:__:__:__:Extremely insensitive
4. Did he seem genuinely interested in you and your problem?
Extremely interested: __:__:__:__:__:Extremely disinterested
5. How clear were his questions?
Extremely clear: __:__:__:__:__:Extremely unclear
6. To what extent was he successful in creating an "open communication environment"--i. e. , did you feel free to tell him what you wanted, to express your fears and feelings, to finish your answers and questions?
Extremely open: __:__:__:__:__:Extremely closed
7. A professional needs to be able to deal with a client's problem without intruding his own attitudes, values, religious, moral, or ethical beliefs; there should be an absence of censorship and constraint. To what extent, if at all, did this physician intrude his own values?
Extremely high intrusion: __:__:__:__:__:No direct or indirect intrusion
8. How competent did this physician seem?
Extremely competent: __:__:__:__:__:Extremely incompetent
9. If this had been your first interview with an actual doctor, how likely would you be to return to this physician again?
Extremely likely: __:__:__:__:__:Extremely unlikely
10. ADDITIONAL COMMENTS: We are interested in selecting for further analysis videotapes which represent particularly good interviews--and those which demonstrate particular problems. What additional feelings or observations do you have about the interview which might help in selection and analysis?

Please write on the back
of this sheet if you like

ACTOR DEBRIEFING
Form II
Date: _____

Location: Giltner _____

Erickson _____

Time: 10__ 11__ 1__ 2__ 3__ 4__

Actor: _____

Student: _____

We are interested in your feelings and observations about the interview you just experienced.

Note: If for some of the questions below you felt there was a change over the course of the interview, you may use a 1, 2, 3, rather than an "x" -- i.e., 1 = first part of the interview; 2 = middle, 3 = end.

1. How comfortable did you feel during the interview?
Extremely comfortable: __:__:__:__:__:Extremely uncomfortable
2. How comfortable did your doctor-interviewer seem?
Extremely comfortable: __:__:__:__:__:Extremely uncomfortable
3. How sensitive was the physician to your feelings?
Extremely sensitive: __:__:__:__:__:Extremely insensitive
4. Did he seem genuinely interested in you and your problem?
Extremely interested: __:__:__:__:__:Extremely disinterested
5. How clear were his questions?
Extremely clear: __:__:__:__:__:Extremely unclear
6. To what extent was he successful in creating an "open communication environment" -- i.e., did you feel free to tell him what you wanted, to express your fears and feelings, to finish your answers and questions?
Extremely open: __:__:__:__:__:Extremely closed
7. A professional needs to be able to deal with a client's problem without intruding his own attitudes, values, religious, moral, or ethical beliefs; there should be an absence of censorship and constraint. To what extent, if at all, did this physician intrude his own values?
Extremely high intrusion: __:__:__:__:__:No direct or indirect intrusion
8. How competent did this physician seem?
Extremely competent: __:__:__:__:__:Extremely incompetent
9. If this had been your first interview with an actual doctor, how likely would you be to return to this physician again?
Extremely likely: __:__:__:__:__:Extremely unlikely
10. **ADDITIONAL COMMENTS:** What additional feelings or observations do you have about the physician or the interview?

APPENDIX V

PATIENTS' RATINGS OF DOCTORS

At the conclusion of each interaction the patient, using the rating form in Appendix IV, evaluated the performance of the doctor. The following tables present the ratings of two patients who participated in this research. The ratings of the third patient included as part of this study are located in the manuscript at Table 6-2, page 92.

Table V -1

Ratings by Patient Two of Eleven Doctors

Debriefing Questions	Doctor										
	VIII	III	X	XIII	VI	V	XI	I	IV	VII	II
1. Patient Comfort	5	5	5	4	4	4	1	2	2	3	1
2. Doctor Comfort	5	4	4	4	4	2	2	2	2	2	1
3. Doctor Sensitivity	5	5	4	5	4	4	2	3	2	1	2
4. Doctor Interest	5	5	4	4	4	4	3	3	2	1	2
5. Question Clarity	5	5	4	4	5	4	4	2	2	3	3
6. Open Environment	5	5	5	4	5	4	3	2	3	1	1
7. Nonintrusion of Doctor's Values	5	4	5	5	3	4	3	3	2	2	1
8. Doctor Competence	5	4	4	5	4	4	3	2	2	2	3
9. Return to Doctor	5	5	5	5	5	5	3	3	1	1	1
Mean	5.00	4.67	4.44	4.44	4.22	3.89	2.67	2.44	2.00	1.78	1.67
Std. Deviation	.00	.47	.50	.50	.61	.74	.82	.50	.47	.79	.82

Table V -2

Ratings by Patient Three of Ten Doctors

Debriefing Questions	Doctor									
	IX	VIII	VII	XI	III	IV	I	XII	VI	II
1. Patient Comfort	5	4	3	4	3	3	4	3	2	1
2. Doctor Comfort	5	4	4	4	4	3	3	3	2	1
3. Doctor Sensitivity	4	4	3.5	4	3.5	3	3	3	1.5	2
4. Doctor Interest	4	4	4	4	4.5	4	3	3	2	2
5. Question Clarity	5	4	5	4	4	3	4	4	3	3
6. Open Environment	5	5	4.5	5	3.5	4	3	2	1	2
7. Nonintrusion of Doctor's Values	5	5	5	5	5	4	3	3	3	3
8. Doctor Competence	5	5	5	1.5	4	3	3	2.5	1.5	2
9. Return to Doctor	5	5	5	5	5	4	2	1	1	1
Mean	4.78	4.44	4.33	4.05	4.06	3.44	3.11	2.72	1.89	1.89
Std. Deviation	.42	.50	.71	1.01	.64	.50	.57	.79	.70	.74

APPENDIX VI

SUMMARY OF INTERACTION MATRICES

The reliability of the VNVIA was established on the basis of 37 interactions representing all of the interviews conducted by three doctors and granted by three patients. The interaction matrices generated for each of these interviews are summarized and categorized by patient and doctor. The following tables present the matrix summary of interviews granted by Patient 2 and conducted by Doctors I, II, and III. The summary of interviews granted by Patients 1 and 3 are located in the manuscript at Tables 6-5 and 6-6, pages 103 and 104.

Table VI - 1
Summary of Eleven Interaction Matrices Generated from
a Series of Interviews Granted by Patient Two

	Doctors											$\sum x$	$\bar{x}$
	II	VII	IV	I	XI	V	VI	XII	X	III	VIII		
A (Dr Mono)	46	13	30	16	11	23	11	6	4	16	8	184	16.72
B (Pat Mono)	24	45	31	44	40	41	51	47	62	54	61	500	46.45
I (NV Int)	1	5	2	4	6	1	2	8	2	4	1	36	3.27
C (Dr to Pat)	7	5	9	11	9	7	5	7	4	7	3	74	6.72
D (Pat to Dr)	9	6	8	10	8	7	6	4	4	8	2	72	6.54
E (Dr to NV)	3	3	1	0	4	2	4	3	1	5	2	28	2.54
F (Pat to NV)	0	9	1	6	5	5	7	19	5	0	4	61	5.54
G (NV to Dr)	1	2	2	2	6	2	3	6	3	4	3	34	3.09
H (NV to Pat)	2	9	3	4	5	6	8	8	4	2	4	55	5.00
Patient Rating	1.7	1.8	2.0	2.4	2.7	3.9	4.2	4.4	4.4	4.7	5.0		
1-4	57	21	43	28	27	33	21	16	11	28	15		
5-8	35	60	43	60	54	55	64	62	73	61	71		
9-12	4	17	6	10	16	8	13	21	10	9	7		

Table VI - 2
Summary of Five Interaction Matrices Generated from
a Series of Interviews Conducted by Doctor One

	Patients						$\sum X$	$\bar{X}$
	1	4	3	2	6			
A (Dr Mono)	13	32	10	16	50		121	24.2
B (Pat Mono)	2	25	58	44	16		145	29.0
I (NV Int)	47	0	3	4	4		58	11.6
C (Dr to Pat)	1	10	2	11	5		29	5.8
D (Pat to Dr)	0	13	5	10	4		32	6.4
E (Dr to NV)	9	5	4	0	7		25	5.0
F (Pat to NV)	7	2	3	6	2		20	4.0
G (NV to Dr)	9	2	2	2	7		22	4.4
H (NV to Pat)	7	4	6	4	2		23	4.6
Patient Rating	2.8	4.2	3.1	2.4	4.7			
z Score	-1.14	-.42	-.38	-.80	1.30			

Table VI - 3
Summary of Five Interaction Matrices Generated from
a Series of Interviews Conducted by Doctor Two

	Patients						$\sum X$	$\bar{X}$
	2	1	5	3	6			
A (Dr Mono)	46	14	11	9	23		103	20.6
B (Pat Mono)	24	6	8	60	9		107	21.4
I (NV Int)	1	37	26	2	23		89	17.8
C (Dr to Pat)	7	3	2	5	7		24	4.8
D (Pat to Dr)	9	2	5	5	2		23	4.6
E (Dr to NV)	3	9	13	1	8		34	6.8
F (Pat to NV)	0	10	8	5	7		30	6.0
G (NV to Dr)	1	9	9	2	14		35	7.0
H (NV to Pat)	2	9	11	5	2		29	5.8
Patient Rating	1.7	2.1	1.9	1.9	2.5			
z Score	-1.36	-1.66	-2.15	-1.65	-1.32			

Table VI -4
Summary of Five Interaction Matrices Generated from
a Series of Interviews Conducted by Doctor Three

	Patients					$\sum X$	$\bar{X}$
	2	5	6	3	7		
A (Dr Mono)	16	39	35	11	19	120	24.0
B (Pat Mono)	54	4	14	57	7	136	27.2
I (NV Int)	4	9	4	1	20	38	7.6
C (Dr to Pat)	7	6	8	9	2	32	6.4
D (Pat to Dr)	8	6	7	5	2	28	5.6
E (Dr to NV)	5	12	10	2	17	46	9.2
F (Pat to NV)	0	5	4	4	6	19	3.8
G (NV to Dr)	4	13	11	6	17	51	10.2
H (NV to Pat)	2	3	3	1	7	16	3.2
Patient Rating	4.7	4.9	4.1	4.0	2.8		
z Score	1.00	.80	.58	.50	.22		

APPENDIX VII

OBSERVER' S CODING MANUAL

Observers were given the following information before starting the coding task. At various points throughout the coding the operating rules were repeated. Very little time was spent discussing what should be included and what should not. For the most part the observers coded all perceptible verbal and nonverbal activity.

APPENDIX VII

OBSERVER' S CODING MANUAL

ACTIVITY CATEGORIES

Observers were instructed to code all perceptible movement in the nonverbal band, with the exception of jaw movement during verbalization, and all perceptible verbal utterance.

- a. Nonverbal Behavior -- Nonverbal behavior includes all perceptible movement of the interactant. Included in nonverbal behavior are postural shifts, shrugs, gestures, facial expressions and head nods. With properly operating television equipment, minute behaviors such as eye blinks, eye shifts, nostril flairs, opening mouth (when not speaking), eyebrow raises and ear wiggles, should be coded. Other minute nonverbal behaviors include slight hand and finger movements, jiggling knees and any movement during the handling of an artifact, e.g., cigarette, ballpoint pen, necktie or clothing. The only behavior not included is jaw movement associated with speech.
- b. Verbal Utterance -- Verbal utterances consisted of all the sounds orally produced by the communicator. Included here were spoken sentences and words, vocalized pauses, e.g.,

"ah" and "hmm," etc., and other paralinguistic phenomena such as audible sighing and the tongue click. Hesitation phenomena created a special problem. When observers were asked to make a judgment about verbal activity at a point of hesitation, there was some question about whether that pause should be recorded as silence or activity. After observing more than 100 interactions which exceeded 15 minutes in length, the investigator concluded that the most accurate transcription of an interaction would occur if observers adopted the following rule. If a speaking individual pauses such that the hesitation is two seconds or less, the pause is considered to be a normal speech hesitation and coded as activity. Any pause whose duration is more than two seconds is coded as silence.

PICTURE FIDELITY

Coding accuracy can be improved by increasing picture fidelity. This study employed the United States standard 525 line television system. This system provides a low fidelity picture and very often does not register fine gradations of movement such as eye blinks or minute finger movements. The fidelity of the picture can be improved by utilizing a television system whose picture is constructed with a greater number of lines. An 800 line system, for

example, would provide a picture similar to a motion picture film of a moderately fine grain.

Problems of fidelity are increased when a view of two full bodies is shown on the same screen. In this case the interactants' heads are usually very small and nonverbal movement in the face, i. e., eye blinks, eye shifts, eyebrow movements, and even some head nods cannot be distinguished. The hands would also be much smaller and minute finger movements would not be distinguished.

In this study the interactant was photographed from the waist up. While this eliminated the possibility of coding movements of the feet, it did allow for coding finer movements in the face and hands. In some cases the waist shot can be expanded to include the knees of the interactant. This type of medium shot allows for coding minute movement in the face and hands and provides an opportunity to code knee movement which is related to foot movement.

Lighting also plays an important part in increasing fidelity. If an interactant is lighted from directly overhead, shadows created by the eye sockets prevent recording major eye blinks and eye shifts. It is important to light the interactant in a way which allows all major areas of the face and body to be clearly and easily seen.

OBSERVER LOOKING BEHAVIOR AND PERCEPTION

The two most prevalent kinds of coding problems were modifying observer looking behavior and securing objective perceptions.

Looking behavior was perhaps the most difficult to deal with because observers had to control natural tendencies in following the interaction flow.

The two phenomena, mentioned briefly in Chapter IV, were "following" and "focusing." "Following" occurs when the observer becomes engrossed in the flow of the interaction. Instead of keeping his gaze locked upon the interactant under consideration, the observer looks at the individual who is speaking. As a result he misses movement made by the nonspeaker. "Focusing" occurs when an observer locks into the perception of one feature, such as a facial expression or hand movement, missing movement in other places.

The best method for overcoming following and focusing is to advise observers against focusing their attention on the television screen surface. By focusing on a spot about two feet in front of the screen observers are able to see movement clearly but not be drawn into any one specific part of the interactant's behavior.

Making objective perceptions or not being distracted from accomplishing the tests was the other major problem. Essentially,

the content of some of the interactions was so intriguing that observers became involved in listening to the interaction and not coding the interaction.

Part of the problem was alleviated because each of the interactions had to be viewed four times (one for each band and each interactant). After repeated viewings the content was no longer new and observers had an easier time concentrating on the coding task. When the content of an interaction was particularly exciting, observers were given the opportunity to see the complete interaction before commencing with the coding process.

Observers also constructed devices of their own to lessen the amount of fatigue caused by the task and to place themselves in a more objective state. For example, it was not unusual for coders to converse with one another during the coding of a particular communication band.

One last comment! Observers had less trouble perceiving and recording all of the verbal and nonverbal activity than they did working to maintain the proper focus of attention and an adequate level of noninvolvement. When disagreements between observers arose, they were resolved with little difficulty. Most errors were a function of misplaced attention.

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