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THE EFFECTS OF PHYSICAL DISTANCES ON VERBAL AND NONVERBAL BEHAVIOR IN DYADIC COMMUNICATION

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ABSTRACT

In explicating the many interrelations among communication behaviors, the scholar should be concerned with discovering a means of schematizing his conception of communication. Such a schema should both aid in his visualization of variables and in his research efforts *per se*. The world-view offered by General Systems Theory provides such a schema. Seen within a systems frame, human communication can be envisioned as a composite of the effects of several interacting subsystems. These subsystems are the lexical, proxemic, kinesic, haptic, vocalic, and chronemic. While delineating the components of the above subsystems, the scholar must also be concerned with specifying the nature of the relationships among these components and the behaviors that bespeak them. The study here involved was concerned with specifying the nature of the relationships between certain components of the proxemic-lexical and proxemic-vocalic subsystems. The means whereby these relations were gauged was in an experiment in which the proxemic subsystem was manipulated to produce stress in the vocalic and lexical subsystems of subjects. It was felt that if the systems notion held, induced stress from one subsystem should be manifested as behavioral change in the others. The extent and direction of that change would be indicative of the subsystems relations.

Specifically, each of eight experimental dyads (eight other dyads constituted a control group) was made to converse a total of twelve minutes across all of the following conditions in the specified order in one setting: baseline, two foot, one foot, chairs touching, one foot, two foot. The effects of this distance change were examined for twenty-four lexical and five vocalic variables. The vocalic variables were amount of vocalization, amount of simultaneous speech, number of words per second, average length of vocalization, and number of filled pauses. None of these variables showed significant change due to the experimental manipulation. Of the lexical categories drawn from the computerized content analysis systems SLCA II, three showed changes in the expected direction. Total connectors (verbs) and positive connectors displayed a direct relation to the proxemic subsystem. Afferent subject words (nouns capable of being sensed) and limiters (adjectives and adverbs capable of being sensed) showed an inverse relation to the proxemic subsystem.

The study conducted helped to demonstrate the viability of the systems framework as applied to human communication. Seen within this frame the proxemic-lexical subsystems showed an unexpectedly close relationship displayed as cubic trends. The failure of other variables in the study to manifest results suggests that the stress inducing stimulus was inadequate to evoke the changes expected. It is suggested that a longer stress induction and a low ambiguity experimental setting be used in future research of this type.

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INTRODUCTION

Within the past twenty years, the study of speech has evolved from speech to speech communication to, simply, communication. These name changes have reflected and encouraged two important disciplinary trends. First of all, they have allowed a latent interest in non-verbal communication to blossom. As early as 1762 presagers of the speech community stressed the importance of nonverbal messages.

> ...the true signs of the passions, ...tones, looks, and gestures...the language...by which emotions of the mind are discovered, and communicated from man to man, are entirely different from words, and independent of them. (Sheridan, 1762)

As indicated, Thomas Sheridan stressed the analysis of overt nonverbal behavior as a means of gauging internal states or passions. This elocutionist trend continued unabated in speech until at least the early twentieth century. At that time disciplinary interest in nonverbal behavior waned. Although elements of the elocutionist tradition persisted in some areas, many scholars felt that the study of speech must be restricted to one's vocal utterances. But after 1960 and the publication of David Berlo's book, The Process of Communication, the study of speech was forever changed. Speech became "speech communication" or "communication." The discipline was broadened and nonverbal behavior once again fell under its academic umbrella. Accordingly, interest in this fruitful area of research was renewed.

Coincident and inseparable from this was a second trend, an emphasis on process, interaction and simultaneity in communication. Berlo's book certainly was an initiator of this movement. This school of thought has gained momentum until today virtually every basic text on communication at least pays lip service to the ideal of process. Ray Birdwhistell (1971) exemplifies those who see the process of communication as related to interdependent sets of variables impacting on each other over time. He stressed communication as a continuous series of events in which there is not <u>a</u> message transmission, but rather <u>several</u> messages of different shapes, compositions and duration transmitted simultaneously. Accordingly, this particular view of process demands communication be viewed as changing over time and that it be seen in a multivariate frame, composed of both verbal and nonverbal behavior.

From the perspective of one within the field of communication, Leonard Hawes (1970) espoused a view of process similar to Birdwhistell's. To him communication was best seen as a series of concatenous events. All events were to be studied interdependently. Moreover, each segment of communication affects and is affected by the entire stream of communication. Hawes noted that the field of speech communication has yet to realize the implications of process as change over time in their research. The field has a "linear concept of process" in which one notes a subject's cognitive state and how it processes information at a single point in time. Process is not at all associated with change over time. (See Smith, 1972, for a discussion of different historical approaches to process in the field.) To Hawes this view creates static, single causation variables, assuming communication to be a quantity that can be passed back and forth from source to receiver.

A cursory review of recent research done in speech communication (Hawes, 1970) will reveal the value of Hawes' statement. If the process of communication is seen as multivariate change over time, clearly the bulk of research in the field has yet to cope with process. For this reason, the author would present a study designed to examine segments of the communication process. The concerns of the study were two-fold. First, a pretheoretic framework is described from which all overt communication behavior can be viewed. Integral to this framework is the process view stressing variable interdependence and change over time. Secondly, certain interrelationships among communicative behaviors over time within the pretheoretic framework are empirically assessed, thus adding to knowledge about the variables explored and also providing at least partial support for the pretheoretic framework. These two concerns are accomplished in four written chapters. Chapter one contains the pretheoretic framework, review of literature, and rationale. Chapter two details the methods and procedures for the exploratory study. Chapter three cites and discusses the results of that study. Chapter four notes limitations and implications of the study that was conducted.

As the speech discipline has evolved from speech communication to communication, a renewed interest in nonverbal behavior and a theoretic stress upon process in human communication have been made manifest. Publication of Berlo's book in 1960 should be seen as a beginning of both these trends. Fifteen years have passed since speech communication became "process" oriented. Yet today most research fails to focus on communication as a time-change activity.

CHAPTER I

RATIONALE AND REVIEW OF LITERATURE

The view of communication here posited is that of a multivariate process. To watch one person communicating with another is to observe the truth of these claims. Many behaviors send messages simultaneously across time and space. And as time changes, so do the communicative behaviors of the participants. If one were concerned with assessing the relationships among these communication behaviors what might his strategy be? If these behaviors are indeed interrelated, one should be able to manipulate one of them, letting the consequent changes manifested in the others bespeak the type of relations involved. If some type of reaction is forthcoming, one might conclude the behaviors to be related and even specify the type of relationship extant. If no behavioral change occurred, the conclusion would be warranted that, at least on face, a discernable relation was absent or perhaps not detected. Critical in such an investigation would also be the time variable which would enable the researcher to view the effects of systematic changes in one behavior on others observed. Within such an experimental paradigm the researcher could scrutinize the changing communication process. It is just such an experiment as this that was proposed and executed by the author. However, before specific details of the study are enumerated, along with its rationale, a theoretic stance and its implications for general systems and communication research will be noted. A pretheoretic frame emerging from an intermingling of systems and communication will be explored along with a review of pertinent literature.

Theoretic Stance

By discovering the systematic order within phenomena the scientist hopes to construct a deductive system that will enhance his explanation and prediction of the universe. Nagel (1961) isolates three elements said to comprise the theories from which scientists make their predictions. First, there is an abstract calculus, the logical skeleton of the explanatory system which defines the notions of that system. Second, there is a set of rules that assign an empirical content to the calculus by relating it to the concrete materials of observation and experiment. Third, there is an interpretation or model for the calculus which supplies flesh for the skeletal structure in terms of familiar conceptual or visualizable material. To the extent that the scientist wishes this tripartite deductive system to be accurate in its explanation and prediction, he must insist upon theoretic parsimony. Such concerns undoubtedly motivated Rudner (1966, p. 10) to limit theory to "a systematically related set of statements, including some lawlike generalizations, that is empirically testable." This is contrasted with Hawes (1975) who envisions levels of theory based upon varying degrees of parsimony. But regardless of which stance one takes, the fact remains that the greatest theoretic parsimony and subsequent explanatory power is obtainable only through the derivation of laws or lawlike statements. Moreover, one's ability to generate lawlike statements is intrinsically bound to the extent to which he can operationalize his concepts and thereby empirically test them. In this light, the relationship between empirical evidence, obtained by experiment, and its theoretic underpinnings seems clear. Empirical evidence, as noted by Nagel (1961), serves as the means by which rules of correspondence assign empirical content to the calculus of theory.

Working within the above-mentioned guidelines, this writer was concerned to find a potential theoretic frame which could describe human communication behavior as he saw it. As noted in the introduction, concepts of multiple variables and change over time were critical to the perspective on communication here advanced. The conceptual schema provided by general systems theory meets these theoretic demands. This schema provides a means of examining multiple variables while looking at changes in states over time. Certainly process is not necessarily inherent in the system's worldview. Nevertheless, it serves as an excellent background against which change over time can be seen and its effects gauged. A more general explication of this theoretic stance will serve to show how it relates to the author's theoretic and communication commitments.

General Systems Theory

Systems theory arose as a reaction against an analytic method in physical science which pitted one isolated variable against another (Fisher and Hawes, 1971). Systems theorists stand united (Sutherland, 1973) in their view that worldly phenomena are both interrelated and complex (multivariate). Isomorphism among variables is key (Sutherland, 1973). However, the "holistic modality" this stance implies neither denies empirical analysis nor objects to the reduction of entities "for scientific manageability. It simply demands that some awareness of the whole precede the attempt to appreciate the parts" (Sutherland, 1973, p. 39). Indeed notions of manipulation and experimentation are key to the system's perspective. According to Sutherland (1973) the extent to which a phenomenon is amenable to systems analysis techniques is contingent upon its accessibility to empirical observation, amenability to precise quantification, and admissibility to experimental manipulation within a lab. Furthermore, one's ability to manipulate one variable and note concomitant consistent changes in others under study (Rapoport, 1969) is one way of gauging systemic relations (Miller, 1971). The essential empirical nature of systems analysis is further evidenced by the goal of its research. The task of general systems theory is to deduce equilibrium states and/or changes that classes of systems undergo. The systems theorist aims to uncover laws governing the existence, behavior or evolution of systems. These laws may involve interdependencies among variables or the responses of the system to environmental input (Rapoport, 1969). Regardless, epistemological claims of the systems theorist are rooted in an experimental empirical tradition stressing the derivation of laws to account for systemic relations and change.

Of course, core to the systems approach is an explication of the term system. A system may be defined as a whole functioning by virtue of its parts (Rapoport, 1968). A static theory of systems is concerned with the system structure. It deals with variable relations, not with their changes in the course of time. Conversely, a dynamic theory of systems studies systemic behavior, the progression of the system from state to state (Rapoport, 1969). In line with these two diverse views of systems analysis is the notion that systems may be either open or closed. A totally closed system, static, allows no substances to enter or leave it. However, living systems are dynamic; they are not closed. The open living system interacts with its environment. Its final state is not dependent upon its initial, but rather is determined by the properties of the system itself. The open system exhibits equifinality, a goal of its own (Rapoport, 1968), independent of initial conditions and determined only by system parameters (von Bertalanffy, 1968). This is in opposition to equilibrium states linked to initial conditions in closed systems. The open living system maintains a constancy in its continuous exchange and flow of component material. The maintenance of this steady state, homeostasis, is effectuated by organic regulating mechanisms within the system (von Bertalanffy, 1968). Relationships tie the system together and are affected by the environment, thus producing a dynamic system changing over time.

In the investigation of any system, open or closed, four levels of analysis may be used: state, parametric, relational or coefficient. State variable analysis entails finding the structural properties of entities within the system. A parametric analysis assigns some specific quantitative or categorical value to the state variable with respect to a point in time or space. On a relational level one attempts to establish the nature of the interrelationships among state variables and their direction of influence. Finally, a coefficient analysis seeks to assign a specific value to the variables which expresses the precise nature of the interrelationships among them at a given point in time and space (Sutherland, 1973).

James Miller (1955) has approached systems in a unique way and has thereby contributed to knowledge in the field from a different perspective. Miller (1955) speaks of information and energy transfer between systems. By his definition, a system is a bounded region in space-time involving energy interchange among its parts and the environment. He conceives of all behavior as energy exchange within an open system or between two systems. Communication becomes the movement of a marker in space from a transmitting system to a receiving system. It follows the same physical laws as the movement of any other sort of matter-energy. "All change over time of matter-energy or information in a system is process" (Miller, 1971).

Miller (1971) also introduces the concept of stress within systems. A range of stability is said to exist for each of the variables within a system. Within this range, the rate of correction of deviations is minimal or zero. Any input that forces a variable beyond its range of stability is stress or strain. The stress may be caused by a lack or excess of input. Stress may be in the form of matter-energy or information. Upon the initiation of stress, adjustment processes within the organism will begin coping behavior. If stress is not relieved, system collapse occurs. Miller (1955) formulated the following testable hypothesis to gauge systems relationships through stress evokation:

> When variables in a system return to equilibrium after stress, the rate of return and strength of the restorative forces are stronger than a linear function of the amount of displacement from the equilibrium point.

General Systems, Theory and Communication

The relationships among theory building, communication and general systems can now be examined in light of previous discussion. The general systems paradigm can be seen first of all as a theoretic model, or analogue (Hawes, 1975). Through a systems analogy, skeletal structure can be added to any theoretic calculus by means of familiar conceptual or visualizable material. To compare the communication process to a system is to clarify the unknown (i.e., communication) by making it and its interrelations more concrete, or at least, mentally visualizable. But general systems is also valuable, from a theoretic perspective, in a second sense. Because of its commitment to the discovery of law-like relations among variables via rigorous empirical methods, general systems can serve to create rules or correspondence that will relate the empirical data the researcher unearths to theoretic calculus. Thus is general systems capable of supplying both empirical and conceptual "flesh" to any abstract calculus amenable to its analysis.

Certainly general systems also relates to the communication process. First of all, as a model it necessarily reflects the multivariate nature of communication espoused by the author. It is committed to the premise that phenomena are interrelated. As well, if one is concerned with a dynamic systems approach (Rapoport, 1969) he is also necessarily concerned with the progression (evolution) of a system from state to state over time. Such concerns add a process view to the multivariate concept mentioned above. Thus does the systems model meet the author's view of communication as both multivariate and process-oriented. Second, systems as a research perspective for communication certainly meets the requirements laid down by the author in his discussion of theory. A systems commitment entails a discovery of lawlike relations among sets of variables through rigorous empirical methods. The knowledge eventually generated by such a tactic would truly be the communication theory for which social scientists in the field are searching.

Mention must be made at this point of the seeming paradox existent between the holistic notions of a multivariate process and any discrete experimental methods used to gather data. The holist would argue that the discrete view of communication, such as would necessarily occur in an experimental meeting, violates systems concepts of a multivariate process. To him a systems analysis must be all-encompassing, devoid of the restrictions accompanying experimental methods. Several points serve to counter this argument. First of all, if one is realistically concerned with the generation of laws that facilitate accurate explanation, he must utilize the experiment as at least a partial basis for his knowledge claims. The experiment by its very nature does manipulate, hold constant, and is somewhat discrete. These qualities, however, do not necessarily keep the experiment from being an invaluable source of knowledge about whole entities. Indeed, introspective phenomenological techniques most often associated with holistic thought are incapable of providing the quality knowledge claims associated with the laws (see Hawes 1975; Rudner, 1966) demanded by sound theory. Second, according to systems theorists, reduction of entities for experimental purposes is permissible (Sutherland, 1973). Indeed, the whole is a composite of its individual parts, it even functions by virtue of their interdependence (Rapoport, 1968). Would not, then, analysis of individual parts of the whole be appropriate? Such discrete analysis does not deny the interworkings of the whole but rather gives special insight into them. The essential problems arise when a researcher, with no conceptualization of the whole, performs a discrete analysis, and assumes he knows all about the entity analyzed. So long as the researcher realizes his reduction and its limitations, such behavior is not only permissible but also required of systems analysis (Sutherland, 1973). Third, justification of reduction of entities can also be found in the logical progression of knowledge claims within the systems paradigm. Initially the researcher may be concerned with defining the system, parts of it, and/or certain interrelations between these parts. He is not obliged to explain all interactivity at one time. For example, if one wanted to determine the components of and relations within the human endocrine system, he might well investigate several segments of the system over a period of time, then eventually combine his findings to obtain a picture of the whole. Such planned discrete investigation does not deny the whole, but is simply an orderly way of analyzing it.

In sum, general systems theory provides a conceptional and investigative scheme within which the author can view human communication behavior. The following pretheoretic framework will now detail communication, as the author sees it, within a systems frame.

Pretheoretic Framework

The communicative apparatus of the organism comprises his communication systems. His system is composed of a set of highly integrated, interdependent subsystems. It should be noted that the author's schema, though based on research and direction of scholarly endeavor in each area named, is nonetheless subjective and open to change or dispute. The schema itself is concerned only with communication behaviors emitted by the individual and attempts to categorize them as much as is possible, on the basis of means of message conveyance. The first subsystem is called lexical. This is perhaps the most investigated of all the subsystems under discussion. Often labeled "verbal communication" (Leathers, 1976) this subsystem consists of the words one utters (Knapp, 1972). The word messages sent from this subsystem may be oral or written, vocal or gestural in nature. The remaining subsystem categorizations will include behaviors taken from what normally is termed nonverbal communication. Knapp (1972) has surveyed the available research in this area, isolated categories, and provided loose operationalizations of the foci of scholars in this field. He delineates four areas of direct communication behavior that become part of the author's schema. Accordingly, the second subsystem is labeled proxemic. This area is "generally considered to be the study of man's use and perception of his social and personal space" (Knapp, 1972, p. 7). Within this subsystem one might study small group ecology, seating arrangements, territoriality and personal space, among other things. A third subsystem will be called kinesic. This subsystem usually includes "gestures, movements of the body, limbs, hands, head, feet and legs, facial expressions, eye behavior, and posture" (Knapp, p. 5). A fourth subsystem would include touching behavior (Knapp, 1972) also called haptics (McCroskey, 1972). Actual physical contact with another may be seen as a special class of kinesic behavior. Subcategories of this behavior would include stroking, hitting, greetings, farewells, holding and other touch behaviors (Knapp, 1972). A fifth and final behavioral subsystem may be called vocalic (McCroskey, 1972). Often labeled "paralanguage" (Knapp, 1972), the elements of this subsystem were given a "tentative" classification by Trager (1958). Although Trager's schema is designed to be only a "first approximation" of the subsystem (Trager, 1958, p. 3), many have nevertheless used it as a general guideline (Mahl and Schulze, 1964). He includes two major categories, voice qualities and vocalizations. Voice qualities include such things as pitch range, rhythm control, tempo, resonance, glottal control, vocal lip control, pitch control, and articulation control. Vocalizations are broken down into characterizers, qualifiers, and segregates. Vocal characterizers include such things as laughing, crying, sighing, yawning, belching, swallowing, coughing and whispering. Vocal qualifiers include intensity (overloud to oversoft), pitch height (overhigh to overlow) and extent (extreme drawl to extreme clip). Vocal segregates include such things as <u>um</u>, <u>uh</u>, <u>ah</u>, and variants thereof. Overall, Trager's operationalizations of the above categories were loose, even vague with regard to segregates. Knapp (1972) goes beyond Trager and adds general categories of nonfluencies, speech rate, latency of response, duration of utterance and interaction rate to the vocalic subsystem (see also Mahl and Schulze, 1964). Knapp makes the additions because Trager's (1958) schema was never intended as a rigid dogmatic all-inclusive set of categories and because these added categories represent areas of research scholars today generally classify as within the vocalic subsystem (Knapp, 1972; Mahl and Schulze, 1964).

Besides the five subsystems stated above, the author would stress the existence of a suprasystem, the chronemic (McCroskey, 1972; Burgoon, 1974). "Chronemics refers to the use of time in communication" (McCroskey, 1972, p. 113). The chronemic suprasystem here envisioned is intrinsic to all communication behavior. It is the internal rhythmic system that serves to coordinate behavior through certain internal physiologic rhythms (Chapple, 1970) and manifests itself in such ways as temporal relations in speech and body movement. It should not be considered a separate subsystem but should be seen as an integrative force across all subsystems.

The above subsystems constitute the whole of one's communication capacity. One would expect that in an interaction, communication would be comprised of the information transmitted through all or several of these subsystems. Certainly some subsystems might relay more salient information than others. Nonetheless, the overall systems view remains multivariate. Moreover, if this network of behaviors is seen across time, then the concept of process is invoked.

To best conceptualize a dyadic encounter within this frame, one might visualize two interacting living systems. The contacting systems approach and join initially, somewhat out of sync, but potentially capable of acting in concert as homeostasis returns to the systems. From this vantage point one can conceptualize the numerous communication subsystems of two individuals interlocking, shaping and countershaping each other's subsequent behaviors as the interaction moves over time (Renshaw, 1975).

Numerous concepts related to this human communication system await exploration. The systems and their coincident variables are multiple. What are the exact natures of these interrelationships? Are they direct, inverse, linear, quadratic, cubic, quartic? What is the extent of the relation among the subsystems; are they all closely or distantly related? As anticipated, will planned change in one subsystem evoke changes in the others? And eventually, what are the laws governing the relationships among human communication systems? These and many others are the types of research questions that the systems theorist can pose. When thus seen and eventually analyzed through systems "eyes" human communication becomes imminently explainable and predictable in a true scientific sense.

Related Literature

Several studies tend to add credence to the systems view of communication here espoused. Von Cranach and Vine (1973), Birdwhistell (1971), Fisher and Hawes (1971), Chapple, Chamberlain, Esser, and Kline (1963), and McCardle (1974) proposed similar systems paradigms with which to view the human communication process. Any study which stressed multiple variables and interactivity of effect could potentially be viewed as evidence for a systems relationship such as the one posited. For example, Reece and Whitman (1962) conducted a study in which they found that warm, expressive body movement (leaning forward, eye contact, smiling, little hand movement) interacted with verbal reinforcement (saying mm-hmm) to produce greater amounts of verbalization. Within the author's systems framework one might say that this study shows that certain changes in one's kinesic and vocalic subsystem interact to produce a certain amount of change in another's lexical system. While such a reinterpretation may be useful, it does not validate the approach and it adds little to the explanation of the study's results. It does, however, suggest that simple bivariate methods fail to recognize the complexity of interacting variables demonstrated by Reece and Whitman (1962).

Albert Mehrabian (1971) conducted extensive investigations of the dimensions of nonverbal behavior. In _post hoc_ data analyses he generated several equations he believed to indicate appropriate weightings of various communicative behaviors on the final attitude derived after an interaction. Assuming additive components of the equation, he asserted one's attitude to be a weighted composite as follows:

$$A_{total} = .07\ A_{verbal} + .38\ A_{vocal} + .55\ A_{facial}$$

Certainly, Mehrabian is to be commended in his efforts to assess the additive impacts of the communicative subsystems on the outcomes of communication. Nevertheless, his weightings are approximations. It is unclear whether any empirical base exists for his assertion. He states (1971) that the equations assume an additivity model. Yet in this same article, he mentions several pieces of evidence which indicate the effect of these component subsystems to be interactive, i.e., a multiplication rule. No such interactive component exists in his equation. Thus, the equations he creates are at least contradictory with his other statements.

Hawes (1970) has committed himself to a process oriented systems analysis of communication. He examined physician-patient communication systems over time. His study involved the manipulation of eye contact, body movement, posture, and body tension. Despite the intricate nature of his analyses, he did not delineate specifically the relationships among systems and explicate all of the communication systems themselves. Moreover, he assumed a systems relationship among the various types of communication, rather than attempting to validate its existence.

By far the strongest evidence supporting the communication system point of view is in the work of William Condon and associates (1966, 1969, 1971). Two terms are used by Condon to describe communication, synchrony and interactional synchrony. Condon argues that as a normal person talks, his body moves in ordered cadence with his articulated speech (Condon and Ogston, 1971). He claims his research is evidence for order pervading human behavior from the micro to the macro level. Certain behaviors are said to change predictably in relation to other behaviors which are, in turn, part of still other changes happening simultaneously and in sequence (Condon and Brosin, 1969). His concept of "whiles" is important, i.e., while this behavior is sustaining and changing, this other behavior is occurring, etc. Thus, does the body move in an intricate harmony with the articulatory mechanism (Condon and Brosin, 1969). Condon does not predict what exact body parts will be moving and in what directions. He does present evidence to show that "bundles" of body-change occur with changes in utterance. These "bundles" are not unlike Rapoport's concept of genotypes (1969) in General Systems Theory. The head ensemble--eyes, mouth, nose, brows, etc.,--move together. The shoulders, arms, hands, and fingers comprise another movement ensemble. The legs and feet are a third grouping. These parts may all act together, separately, or with different yet proportionate speeds. All of this process, body movement/speech coordination, is called synchrony. Condon and associates, using sound film and a time-motion analyzer, have found such synchrony exhibited in normal communication behavior.

Interactional* synchrony is the coordination of the speech and body movements of two individuals while they converse. This is the intermeshing of two or more

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*The reader should note that interaction as described by Condon may, but not necessarily, coincide with the use of interaction in statistics.

synchronous systems. Body movements and articulation of two or more interactants should sustain and change direction together (Condon and Ogston, 1971). For example, as the receiver lifts a cigarette to his lips, draws on it, and lowers it again, the boundaries of the major components of this action will coincide with the boundaries of behavioral flow in the source (Kendon, 1970). Interactional synchrony appears to be a universal phenomenon (McCardle, 1974). Kendon (1963) found synchrony to be more frequent in close friends or married couples who "get on well" than in strangers interacting for the first time. Synchrony was observed in a group of eight persons listening to a ninth talk. It was also seen in a group of four (Condon and Ogston, 1971). Synchrony may vary in type according to one's respective role in an interaction (Kendon, 1970). Preliminary findings also show that while two individuals interact, their electroencephalograms, as well as external behaviors, are "synchronized" (Davis, 1973).

Condon's work seems supportive of a systems view inclusive of verbal and nonverbal communication. His studies indicate the interrelatedness of these behaviors within and between people. But Condon's work is lacking in at least two ways. First, Condon fails to deal with man's use of physical distance. Numerous studies (e.g., Garner, 1972) have shown this to be a key variable in analyzing one's communicative behavior. And, second, he fails to specify the relationships between communicative subsystems. He is concerned with describing behavioral events over time, rather than in specifying systemic relations between subsystems over time.

All of the empirical research reviewed lends credence to the notion of communication systems. One's communicative behaviors are highly integrated. Some type of interrelatedness underlies verbal and nonverbal communication. The systems' schema also seems to fit when two or more individuals interact. Though not specifically interpreting their results in a systems paradigm, Baxter and Rozelle (1975) suggest systemic relationships of the type discussed in the pretheoretic frame, especially in the area of kinesic behavior. From a system perspective, Baxter and Rozelle may be said to have generated systemic stress through crowding and then measured the effects of that stress on numerous types of behaviors. This concept is consistent with Miller's (1971) discussion of stress in systems. Their subjects experienced, in order, no crowding, mild crowding, high crowding and mild crowding. Thus, in Miller's (1971) terms, they noted both the displacement in equilibrium and its rate of return. Of the forty-six verbal and nonverbal behaviors these authors examined, spatial intrusion was found to produce significant displacements in six general categories. Speaking time, frequency of speech, frequency of gaze aversion, head/neck movement, arm crossing, body rotation and foot activity were found to be significantly affected by severe crowding. The trends were toward less speaking time, more frequency of speech, more gaze aversion, more head/neck movement, more body rotation and less foot activity in the most crowded condition. All of the relationships above seem best described as curvilinear over time.* Specific curvilinear equations could have been generated to best describe the relations had the authors been so inclined. Thus, Baxter and Rozelle reported that relations characteristic of systems in stress as they move from displacement and return to equilibrium are also present in the verbal and nonverbal behavior of humans. Such evidence lends support for the pretheoretic position of this study. Despite the fact that Baxter and Rozelle failed to specify the exact types of relations among complex "bundles" of variables, they did provide data on simple relationships between spatial and kinesic behaviors. They did not provide adequate examination of vocalic and lexical subsystems as they relate to changes in one's spatial environment over time.

A recent study (Markel, Long, and Saine, 1976) has examined the relation between space and sex and several vocalic variables. Among others, they explored the relationship between interpersonal distance and total conversation time taken by both members of the dyad, rate at which

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*Renshaw (1975) has noted the possibility that curvilinear findings can be in part a function of the number of time intervals sampled and the length of intertrial intervals.

utterances were produced, and the average duration of simultaneous speech (ADS)--that is, two people talking at the same time. Of these particular variables, they found significance only on ADS, noting it was greater in normal seating (three feet), as opposed to a far (twelve feet) seating, arrangement. Their work provides valuable operationalizations and constitutes a most recent attempt to measure the relations between spatial settings and the vocalic subsystem.

A summary of the relevant literature lends support for the systems perspective as, at least, a descriptive tool. Human communication can be described within this frame. Nevertheless, two vital elements are missing from the studies to date. First of all, little research has attempted to describe precisely the relationships among communication subsystems. One ought to be able to specify that for a unit change in one specific subsystem, a corresponding change best described by specific equations will occur in other related communication subsystems over time. Second, research in this area has failed to explore the lexical and vocalic subsystems adequately. Studies have concentrated on microanalysis or have used kinesic behavior as a prime dependent variable. This paper is concerned primarily with the second criticism. Demonstration of lexical and vocalic subsystems as significant variables, related to proxemics, over time would not only provide important systemic information itself, but would also aid in answering the first question regarding the specific relationship between some lexical and vocalic behaviors with proxemics over time.

Rationale

As noted initially, an overriding concern of the systems theorist is the nature of the relationships among the variables he investigates. One way of assessing the nature of these relationships is by means of inducing change in one system and gauging subsequent changes in the others (Rapoport, 1969). Miller (1971) adds a new concept to systemic change as a relational determiner by showing stress to be a means of evoking change, displacement from and return to equilibrium, in systems. If one system can be used to evoke and reduce stress in others, the researcher can then determine the type of relationship existent between that system used to induce stress and those that were the objects of that induction.

As noted in the above review of literature, knowledge of the proxemic, lexical, and vocalic subsystems relations is lacking. These specific subsystems were therefore chosen by the researcher to be the focal point of his investigation. In accord with the logic heretofore discussed, one of these three subsystems was chosen to be manipulated as a stress inducer. Through this subsystem, stress was induced and relieved in the other two subsystems over time. According to Miller (1971), if stress can be incrementally induced in systems, that same stress can also be incrementally relieved in those systems by systematic reductions in the stress stimulus. Several criteria are immediately discernable that serve to determine which subsystem might be used to induce stress. First, that which induces stress must have the propensity, based on logical and empirical proof, to evoke stress in the systems under question. Second, that system must also be capable of precise manipulation so that there can be comparable amounts of stress induction and release. Using these two criteria as guidelines the author selected the proxemic subsystem to serve as stress inducer. The effects of stress induction and release were therefore witnessed in the remaining subsystems, the vocalic and lexical. A further explication of these three specific subsystems will add insight into the reasons for the above selection and at the same time serve to isolate subsystem components critical to a stress related experiment.

Proxemic Subsystem

The proxemic subsystem has to do with "man's use and perception of his social and personal space" (Knapp, 1972, p. 7). Man uses space or interpersonal distance to communicate. How he does so involves the study of the proxemic subsystem (Leathers, 1976). The proxemic subsystem of a person is best defined in terms of physical distance and measurement (Hall, 1959). The distances between people, which Hall (1959) calls informal space, have been broken down (Hall, 1959) into four gross categories: public distance (12 feet or more); social distance (4-12 feet); personal distance (1½-4 feet); and intimate distance (6-18 inches). It is assumed that proxemic behavior can best be gauged on an ordinal scale with lesser amounts of distance resulting in "more" loss of personal distance or space. Most of the research with this particular subsystem has utilized personal space, a combination of the intimate and personal distances (6 inches-4 feet). Willis (1966) and Watson (1970) have provided substantiation for the operationalizations of personal space in terms of distance measurements. Others have provided detailed analysis of the research findings in this area (Evan and Howard, 1973). Generally, studies indicate loss of personal space and resultant crowding to produce adverse effects upon one's attitude toward his environment, his attitude toward his fellow man, his attitude toward participation in social interaction, his mental health, and his physical health (Stokols, 1972).

Several experimenters have tried to connect loss of personal space with increased stress. Animal studies show physiological ties between stress and overcrowding (Christian, 1961) that may be generalizable to humans (Zlutnick and Altman, 1972). Marler (1976) noted that closer proximity of one animal to another is a basic aggression-provoking stimulus. In a series of studies (1955a, 1955b, 1956, 1957), he systematically moved the perches of chaffinches closer and further apart. He found the probability of aggression breaking out to be a function of perch distance. The closer the perches, the more likely were acts of aggression. Robert Sommer (1959) found similar results in his studies of personal space invasion with humans. Other direct experimentation with humans, using independent samples, linked spatial intrusion to stress through increase in GSR and anxiety (McBride, King, and James, 1965; Baxter and Deanovich, 1970). Baxter and Deanovich (1970) found stressful anxiety evoked by invasion of space to be a direct function of time. Garner (1972) noted the stress of spatial intrusion to be behaviorally manifested through increases in filled pauses. Previous research would indicate one's proxemic subsystem to be both precisely manipulatable and capable of evoking stress manifested in varying behaviors. It would appear that if individuals are moved closer to each other in increments until personal space is violated, stress within the communication system will be generated. If there is interdependence among proxemic, lexical and vocalic subsystems, this stress should be manifested as behavioral changes in the dependent variables representing these subsystems. Furthermore, as stress is removed there should be incremental changes back toward the base line or equilibrium point in the dependent variables. One might expect also that those variables directly related to the systemic stress or anxiety would display a relationship best described as a second-order (quadratic) polynomial (Hays, 1963).*

Lexical Subsystem

The study of this subsystem encompasses one's use of spoken, written, or signed words (Knapp, 1972). Scholars have pursued many avenues in attempts to analyze human lexical communication. Phonetic, morphemic, and syntactic features have been examined. Words have been classified into syntactic categories. Frequency counts, type-token ratios, adjective-adverb quotients and many other descriptive methods have been utilized (Cummings and Wright, 1976). In deciding which of these methods to select as a tool for analysis of the lexical subsystem, the researcher must be motivated by a singular concern: "... to get good structural descriptions of systems that represent corpuses of verbal output as a sound preparation for genuine mathematico-hypothetical theory construction" (Rapoport, 1969, p. 35). Such precise descriptions are obtainable only with a priori experimentally validated sets of categories that are capable of demonstrating multiple relationships among variables (Cummings and Wright, 1976). A computerized content analysis system, SLCA II (Cummings and Renshaw, 1976), was found to meet the criteria stated above which are in line with the author's previously stated theoretic stance. Thus, SLCA II, with its set of relevant grammatical categories, was

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*In the methods and procedures section, a third order polynomial (cubic) will be specified as the expectation because of the inclusion of baseline data.

selected as a means of defining the lexical subsystem as envisioned by the author (Cummings and Renshaw, 1976; Cummings and Wright, 1976). SLCA II is designed to classify each word of a message into a syntactic category. SLCA II provides analysis of several categories based upon the position of a word within its utterance context (Cummings and Renshaw, 1976). The core of the SLCA II system is the categorizing of words as being subject signs, connectors, and limiters. Subject signs are the subjects and objects of verbs in a given message. Connectors are defined as all verbs in a message. Limiters are words that serve to modify either subjects or verbs. Subject signs and limiters can be further classified as afferent (referring to "objects" capable of being sensed) or efferent (referring to "objects" which cannot be sensed). Subject signs and connectors are described as primitive (having no limiters) or defined (one or more limiters). Within this general categorial frame, SLCA II analyzes messages in two stages. In stage one there is classification of nouns as afferent-efferent; analysis of connectors according to tense, voice, mood, and positive-negative attributes; analysis of subject and connector limiters, and analysis of articles, prepositions, collectives, pronouns and other. In stage two, verbs are classified as action or comparison; nouns are further classified as primitive/defined, positive/negative, subject words/connector limiters; and pronouns are analyzed positionally (Cummings and Renshaw, 1976).

Cummings (1970) found highly anxious subjects to encode significantly more total primitives and less total defined words. Low anxious subjects encoded significantly more total words, using TOT-3 as the measure; more defined subject words, and more efferent limiters of subject words. These categories, at least conceptually related to stress, would certainly be key in an attempt to gauge the effect of stress induction and reduction on the lexical subsystem. In addition, because of the scarcity of research in this area, the several gross categories provided by SLCA II would also yield pertinent information in any investigative research. These categories are: total connectors; positive connectors; future tense connectors; present tense connectors; past tense connectors; subject words; limiters; efferent subject words and limiters; afferent subject words and limiters; negative connectors; intransitive connectors; transitive connectors; subjunctive connectors; indicative connectors; action connectors; comparison connectors; demonstratives; and collectives.

A final lexical category, generated by the author, was analyzed through the SLCA II system. This category was labeled "conversation reinforcers" and consists of the words yeah and uhhuh. In a 1975 study, Fishman found these "minimal responses" to be used by males to signal disinterest at the end of another conversant's turn. Women, however, evidently use these words throughout the stream of conversation to signal interest in what is being said. Thus, these words in context would tend to occur at the beginning of a person's turn or as a one-word turn in the midst of the conversational stream. But regardless of the contextual setting, the overall function of yeah/uhhuh seems t be reinforcement, either positive or negative, of another's statements. It was felt that the occurrence of these terms constituted a lexical behavior that an investigative study of systemic relations under stress ought to gauge because of their close relationship to the affective dimension of conversation.

In sum, SLCA II with its 102 possible categories, provides a comprehensive tool with which to gauge lexical behavior. Use of this system provides the means whereby systemic relations between the proxemic and lexical subsystems might be examined in a precise way. One should be able to induce and release stress in the lexical subsystem by means of proxemic manipulation. SLCA II enables the researcher to state with precision the impact of those manipulations on lexical encoding and thereby delineate proxemic-lexical interrelations.

Vocalic Subsystem

If one were to eliminate words themselves from oral conversation, all that would remain would constitute a vocalic subsystem of communication. Its stress is upon the vocal, rather than the lexical, elements of messages (Burgoon, 1974). The elements of this subsystem were first tentatively named by Trager (1958) as: (1) voice qualities--pitch range, vocal lip control, articulation control, rhythm control, resonance, tempo (2) vocal characterizers--laughing, crying, whispering, snoring, yelling, moaning, groaning, yawning, whining, stretching, sucking, spitting, sneezing, coughing, clearing of the throat, sniffing, sighing, swallowing, heavily marked inhaling or exhaling, belches, and hiccups (3) vocal qualifiers--intensity, pitch, height, extent (4) vocal segregates--uh and variants, silent pauses, and intruding sounds. Mahl and Schulze (1964) and Knapp (1972) list several other behaviors "relevant for any discussion of communication and vocal behavior" to be included into the vocalic subsystem: dialect or accent nonfluencies, speech rate, latency of response, duration of utterance, and interaction rates. All of these listed variables would constitute those most researchers feel to comprise this subsystem.

Within the framework of a behavioral analysis (Mahl and Schulze, 1964) of this vocalic subsystem, several variables can be isolated that bear a direct relation to the interests of this study. As mentioned earlier, Baxter and Rozelle (1975), Markel, Long, and Saine (1976) and Garner (1972) have found that unfilled pauses, simultaneous speech, amount of speaking time and frequency of speech are all related to spatial intrusion. Variations in speaking distance should evoke change in these variables. From another perspective, Maclay and Osgood (1959) and Jaffe and Feldstein (1970) have found the occurrence of pauses, filled and unfilled, to be related to anxiety and/or stress in general. Another variable, rate--the number of words in a message divided by some time figure--is also linked to anxiety (Mahl and Schulze, 1964). Rate has even been found to be a function of the duration and frequency of silent pauses (Goldman-Eisler, 1956). It may be that since spatial intrusion affects pauses, it might also impact on rate. Simultaneous speech, amount of speaking time, filled and unfilled pauses, and rate have all been shown to be related to either personal space or stress and are therefore the subset of variables of primary interest in this study as comprising the vocalic subsystem.

Research Question

Reviewed research would indicate interrelations among communication behaviors. Some researchers have worked out of a systems perspective without delineating specific relations among the systems they explored. And still other researchers (i.e., Baxter and Rozelle) have given excellent descriptions of some systems relations while neglecting others. Because of the need to specify exact systemic relations and because of a failure to date to detail the specific relations between critical elements of the vocalic and lexical subsystems as related to proxemics, the following research question was central to this investigative study:

> Given incremental changes over time in the proxemic subsystems of subjects, what set of equations will best describe the changing relationship between the proxemic subsystem and the operationalized components of the lexical and vocalic subsystems of subjects.

It must certainly be noted that this one research question does not provide all the needed information about the human communication system. It does not detail all of the communication process nor does it explicate all of the possible relationships among the communication subsystems contained in the author's pretheoretic framework. But this study will investigate communication as a time-related phenomenon. It also will state with much-to-be-desired specificity what the relationships are between certain communication subsystems under specific conditions within a given set of time frames. The study is, in essence, a necessary first step in the explication and validation of communication as a system in process.

CHAPTER II

METHODS AND PROCEDURES

This study was designed to answer the research question posed in chapter one. This chapter details the specific methods and procedures that aided in answering the proposed question. This discussion in chapter two will focus on subjects, procedures, measures, variables and data analysis.

Subjects

The subjects for this experiment were taken from the population of students enrolled in Speech Communication 1113 at the University of Oklahoma in the summer of 1976. The study used sixteen randomly selected subjects from one class paired with sixteen other subjects from another class. Subjects from different classes were paired together in order to avoid contamination by prior familiarity. The sixteen pairs of subjects were randomly assigned to and equally divided between experimental and control groups.

Before precise generalizations can be made from this study, random replications with larger samples will be required. This recognizes that the presence of a single experimenter throughout the course of the study controls for Type G error, but not Type R error (Lindquist, 1953).

Procedures

Students in a class of Speech Communication 1113 not utilized in the experiment were asked to generate a list of topics salient for use in the experimental conditions. Each topic generated was randomly assigned a number. Of these several topics, five were then randomly chosen to be presented to the two classes of 1113 to be utilized in the experiment. These two classes rank ordered the five topics in terms of salience. Ranks ranged from a high of one to a low of five. That topic most often ranked first by the subject judges was given to subjects as the topic of conversation during five intratrial intervals. The other four topics served as a pool from which the experimenter randomly chose one topic to be used by conversants during a pre-intra-trial interval established to obtain baseline data for subjects on all dependent variables. The extent of agreement among the subject judges as to the rank ordering of the five topics was assessed through the use of Kendall's Coefficient of Concordance (Siegel, 1956). Sixteen randomly paired subjects were taken, two at a time, from their 1113 classes and kept separate until the time of their participation in the experiment. In the experimental condition, subjects were asked to arrange two chairs in a position comfortable for conversation. They conversed for two-minutes-fifteen-seconds on their designated topic, this pre-intra-trial interval being used to supply baseline data for the dyad. A two-minute-fifteen-second intra-trial interval with a fifteen-second inter-trail interval was used. For purposes of analysis, however, data analyzed was the latter two minutes of conversation recorded during the intra-trial period. Baxter and Rozelle (1975) have found two minutes to be sufficient time to provide appropriate baseline and experimental data in conversational analysis. They found that analysis of certain portions of the taped data enabled them to eliminate conversational disruption due to events extraneous to the experimental manipulation. Subjects were told the experiment dealt with the effects of spatial changes on conversation and that they should expect change in seating positions throughout the experiment. Such procedure should not have produced demand characteristics as subjects are unable to manipulate the variables of concern in this study (Cummings and Renshaw, 1976; and Gerbner, Holsti, Krippendorff, Paisley and Stone, 1969). After the baseline (pre-intra-trial interval) was obtained, subjects were given the topic of conversation judged most salient and allowed to talk to each other. Two chairs were arranged two feet apart, offset facing each other. After the first two-minute-fifteen-second intra-trial interval, chairs were moved to a one foot distance. After the second intra-trial interval, chairs were arranged to where the front chair legs were touching. After the third, chairs were moved back to a one foot distance, and the fourth, back to two feet.

The distance settings in and ordering of the experimental conditions (two, one, touching, one, and two feet) were justified on the basis of Hall's (1959) personal (1½-4 feet) and intimate (6-18 inches) distances. The diminuation and increase of distance across the trials exemplifies movement from little, to mild, to high, to mild, to little crowding. Rationale for such experimental procedure is provided by Baxter and Rozelle (1975) as well as Miller (1955). The inter-trial interval of 15 seconds was considered the minimal amount of time needed for the experimenter to stop recording, rearrange the subjects, and recommence the experiment.

A control group was utilized in the study so that the experimenter might determine the effects of his experimental procedures on the subjects. Control subjects were given the regular topic statement (see Appendix A). They experienced the same number of inter-trial and intra-trial intervals as the experimental subjects. However, chairs were placed offset, facing each other, in the first distance setting (two feet), remaining in that position for all trials.

Measures

A Lafayette Voice-Activated Relay, measuring in hundredths of a second, measured amount of vocalization. Amount of pause was the length of the intra-trial period less the total vocalization. Amount of simultaneous speech was the summation of vocalizations of each of the two subjects in a given intra-trial interval less the total amount of vocalization for that period. The average length of vocalization was the summated lengths of each continuous vocalization in each intra-trial period divided by the number of vocalizations in that period. Rate was the number of words-per-second in each intratrial interval.

The justification for the measurement used on the vocalic variables may be found in Markel, Long, and Saine (1976) and Maclay and Osgood (1959).

Lexical variables and filled pauses were measured according to the proportional word index score in SLCA II, i.e., the frequency of that category divided by the sum of subject signs, limiters, and connectors in each message.

Variables

The independent variable in the study was subjects' proxemic subsystems, distances between subjects in the dyad. It was assumed this also operationalized systemic stress.

Dependent variables were the subjects' lexical and vocalic subsystems. Subjects' lexical subsystems were operationalized as the appropriate categories from SLCA II (Cummings and Renshaw, 1976). The categories found to be related to anxiety were employed, including total primitives, total defined words, total words, defined subject words, and efferent limiters of subject words. Other categories selected for analysis were total connectors, positive connectors, future tense connectors, present tense connectors, past tense connectors, subject words, limiters, efferent subject words and limiters, afferent subject words and limiters, negative connectors, intransitive connectors, transitive connectors, subjunctive connectors, indicative connectors, action connectors, comparison connectors, demonstratives, collectives, and conversation reinforcers. The use of these more gross categories were thought to yield information which would enable the author to make more precise statements about lexical categories.

That portion of subjects' vocalic subsystems utilized in the study was operationalized as amount of vocalization, amount of unfilled pause, amount of simultaneous speech, number of words per second, average length of vocalization, and number of filled pauses.

Several terms need operational clarification. Vocalization as used in this study means "a continuous sound made by a speaker who has the floor" (Jaffe and Feldstein, 1970). To possess the floor is to be engaging in unilateral production of sound (Jaffe and Felstein, 1970). Thus, the total lack of vocalization, bilateral silence, is termed unfilled pause. A filled pause is marked by a type of vocalization with the absence of words. <u>Uh</u> and <u>ah</u> were the symbols used to mark filled pauses (Trager, 1958; Maclay and Osgood, 1959; and Dibner, 1956). Simultaneous speech is, at least, bilateral vocalization between conversants (Jaffe and Feldstein, 1970). Rate, as used in the experimental study, was defined as number of words per intra-trial interval (120 seconds) (Maclay and Osgood, 1959). To compute the average length of vocalization, the experimenter timed all unilateral vocalizations in each intra-trial interval and divided their combined time total by their frequency of occurrence (Baxter and Rozelle, 1975).

Data Analysis

For the purposes of analysis each dyad was viewed as one dyadic communication system. Thus, where appropriate, scores on each dependent variable were summated for each dyad, making no distinction between individuals. Data analysis was performed in three successive steps. First, scores on the dependent variables were subjected to a 2 x 6 analysis of variance for a mixed model. There was one independent factor, experimental and control group. The repeated factor was the level of crowding. The purpose of this analysis was to determine which variables manifested significant group differences and to obtain the appropriate error terms for the experimental condition. If variables manifested no significant differences between experimental and control groups, analysis was stopped. With variables manifesting such differences, a second analytic step was initiated. On all variables displaying significant group differences, the baselines of both groups on each variable were compared using the t-test statistic. If there was found a significant difference between groups in the baseline condition, analysis was ended. Such differences would indicate that the groups were intrinsically different, regardless of the experimental induction. However, if a nonsignificant difference was found in baseline comparisons of those variables with significant group differences, analysis proceeded to a third stage. These variables were submitted to a trend analysis for repeated measures (Kerlinger and Pedhazur, 1973) performed on the experimental group only. Trend analyses were performed using the first through fifth order polynomials, accepting the best equation ($p < .05$) as determined by the F test statistic (Kerlinger and Pedhazur, 1973). With the baseline data included, a third order polynomial (cubic) equation was expected to be the best predictor if the experimental manipulation indicated increasing and decreasing levels of stress. A significant within group F ratio was not required for the conducting of the trend analyses (Hays, 1963).

The guiding principle behind this study was explication of the relationships between the proxemic and the lexical and vocalic subsystems of subjects in the experiment. The appropriate equations describing these relations were stated. No attempt was made to explicate the interrelationship of the lexical-vocalic subsystems. Small sample size and the repeated measures model utilized both made any such statements inappropriate. A future study (see chapter four) should have this as its primary concern. Nevertheless, this study conducted was a necessary first step in providing predictive equations on the pattern of interrelationships between these subsystems.

CHAPTER III

RESULTS AND DISCUSSION

In a series of analytic steps, five vocalic and twenty-four lexical variables were analyzed to determine the impact of the proxemic manipulation upon them. The results and discussion of their meaning are the foci of the chapter.

Topic Generation and Selection

As noted in chapter two, a sample of subjects not part of the experiment generated lists of possible topics to be discussed in the described experimental setting. After duplications were eliminated, a list of twenty-one different topics (see Appendix A) was left. Of these topics, five were randomly selected by the experimenter to be presented in the experiment itself (Appendix B). The topics were ordered by the experimenter according to the proportions of subjects' ranking that topic. "Reinstatement of capital punishment" (see Appendix C) received the largest proportion of both first and second rankings. Topic four was second highest; topic five was ranked third; topic one, fourth; and topic two, fifth.

A Kendall Coefficient of Concordance W (Siegel, 1956) was used to judge the amount of agreement among the subject judges ranking these topics. The obtained W was .205.

Its computed χ^2 value was 31.98, df = 4, significant at $p < .05$ (Friedman, 1940; Siegel, 1956).

Vocalic Subsystem

As noted in chapter two, the primary means of measuring these variables was a Voice Activated Relay. Because of the high subjectivity in judgment involved in setting the sensitivity level of this machine to pick up amounts of voicing, an *a posteriori* check was conducted. Two independent judges were asked to set the sensitivity dial on the level they deemed best to obtain optimal voice with minimal noise. This procedure was performed monaurally for each dyad and in stereo for each separate subject. Thus, settings were obtained for the sixteen dyads and for each of the thirty-two subjects. The settings made by the judges were compared to those of the experimenter. Mean proportions of agreement were calculated for each of the three channel combinations (see Appendices E-F). With combined channels (dyad), mean agreement was 59.38%. Separate channel A (person A) yielded a proportion of agreement at 71.87% and channel B, 75%. Thus, the replicability of the experimenter's judgments as to sensitivity setting seems probable, especially when separate channels are used.

The variables studied in this subsystem were vocalization/unfilled pause, simultaneous speech, rate, mean vocalization, and filled pause. None of these exhibited significant differences between experimental and control groups.*

Lexical Subsystem

Of the twenty-four lexical variables examined, nine exhibited significant experimental/control group differences.** Conversation reinforcers ($F = 5.42$, $df = 1$, $p = .033$); action connectors ($F = 15.38$, $df = 1$, $p = .001$); subjunctive connectors ($F = 5.88$, $df = 1$, $p = .027$); afferent subject words and limiters ($F = 10.97$, $df = 1$, $p = .005$); limiters ($F = 4.87$, $df = 1$, $p = .042$); past tense connectors ($F = 6.41$, $df = 1$, $p = .022$); present tense connectors ($F = 11.42$, $df = 1$, $p = .004$); positive connectors ($F = 5.31$, $df = 1$, $p = .035$); and total connectors ($F = 6.95$, $df = 1$, $p = .018$) were the variables exhibiting these differences.***

A comparison of the baselines of these nine variables showed two to manifest significant differences. The experimental and control groups of both conversation reinforcers ($t = 3.41$, $df = 14$) and present tense connectors ($t = 2.40$, $df = 14$) proved to be different prior to the experimental induction. These variables were therefore eliminated from further analysis since experimental trends would be misleading.

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*For all analyses of variance and means of these variables, see Appendices I-M, respectively.

**For all analyses of variance and means for the nonsignificant lexical variables, See Appendices N-BB, respectively.

***Complete analyses of variance and all means for these variables are contained in Appendices CC-KK, respectively.

Trend analyses were performed on the seven remaining lexical variables. Action connectors displayed no significant trends in the experimental group (see Table 1).

TABLE 1

TREND ANALYSIS FOR ACTION CONNECTORS

Source Experimental	Mean Square	DF	F-Ratio	P
Total	0.002	47		
Subjects (Between)	0.004	7		
Trials	0.005	(5)	1.800	0.139
LINEAR	0.003	1	1.453	0.236
QUADRATIC	0.002	1	0.966	0.332
CUBIC	0.008	1	3.534	0.068
QUARTIC	0.001	1	0.421	0.521
QUINTIC	0.004	1	1.695	0.201
Residual	0.002	35		

Subjunctive connectors displayed no significant trends, despite the significant difference between the experimental and control groups (See Table 2).

TABLE 2

TREND ANALYSIS FOR SUBJUNCTIVE CONNECTORS

Source Experimental	Mean Square	DF	F-Ratio	P
Total	0.000*	47		
Subjects (Between)	0.001	7		
Trials	0.000	(5)	0.521	0.759
LINEAR	0.000	1	0.217	0.644
QUADRATIC	0.000	1	0.018	0.894
CUBIC	0.000	1	0.418	0.522
QUARTIC	0.001	1	1.760	0.193
QUINTIC	0.000	1	0.189	0.666
Residual	0.000	35		

*The zeroes reflect rounding error.

Afferent subject words and limiters exhibited a significant cubic trend (F(cubic) = 4.67, df = 1, p = .030; see Table 3).

TABLE 3

TREND ANALYSIS FOR AFFERENT SUBJECT WORDS AND LIMITERS

Source Experimental	Mean Square	DF	F-Ratio	P
Total	0.003	47		
Subjects (Between)	0.004	7		
Trials	0.005	(5)	1.651	0.173
LINEAR	0.010	1	3.103	0.087
QUADRATIC	0.001	1	0.428	0.517
CUBIC	0.015	1	4.694	0.037*
QUARTIC	0.000	1	0.020	0.890
QUINTIC	0.000	1	0.009	0.926
Residual	0.003	35		

*Statistically significant.

Limiters displayed a significant inverse linear trend across the experimental group ($F(linear) = 8.14$, $df = 1$, $p = .007$; see Table 4).

TABLE 4

TREND ANALYSIS FOR LIMITERS

Source Experimental	Mean Square	DF	F-Ratio	P
Total	0.003	47		
Subjects (Between)	0.007	7		
Trials	0.005	(5)	2.291	0.067
LINEAR	·0.019	1	8.165	0.007*
QUADRATIC	0.001	1	0.361	0.552
CUBIC	0.007	1	2.832	0.101
QUARTIC	0.000	1	0.004	0.949
QUINTIC	0.000	1	0.092	0.763
Residual	0.002	35		

*Statistically significant.

Past tense connectors showed no significant trends (see Table 5).

TABLE 5

TREND ANALYSIS FOR PAST TENSE CONNECTORS

Source Experimental	Mean Square	DF	F-Ratio	P
Total	0.001	47		
Subjects (Between)	0.002	7	2.438	0.038
Trials	0.001	(5)	1.364	0.262
LINEAR	0.001	1	0.712	0.405
QUADRATIC	0.001	1	1.431	0.240
CUBIC	0.001	1	1.338	0.255
QUARTIC	0.003	1	3.329	0.077
QUINTIC	0.000	1	0.012	0.915
Residual	0.001	35		

Positive connectors displayed a significant cubic trend ($F(\text{cubic}) = 8.56$, $df = 1$, $p = .006$; see Table 6).

TABLE 6

TREND ANALYSIS FOR POSITIVE CONNECTORS

Source Experimental	Mean Square	DF	F-Ratio	P
Total	0.003	47		
Subjects (Between)	0.008	7		
Trials	0.004	(5)	2.868	0.029
LINEAR	0.007	1	5.086	0.030
QUADRATIC	0.000	1	0.068	0.796
CUBIC	0.012	1	8.674	0.006*
QUARTIC	0.000	1	0.010	0.919
QUINTIC	0.001	1	0.501	0.484
Residual	0.001	35		

*Statistically significant.

Total connectors also showed a significant cubic trend ($F(\text{cubic}) = 6.95$, $df = 1$, $p = .001$; see Table 7).

TABLE 7

TREND ANALYSIS FOR TOTAL CONNECTORS

Source Experimental	Mean Square	DF	F-Ratio	P
Total	0.003	47		
Subjects (Between)	0.009	7		
Trials	0.005	(5)	2.587	0.043
LINEAR	0.004	1	2.203	0.147
QUADRATIC	0.000	1	0.159	0.693
CUBIC	0.015	1	7.867	0.008*
QUARTIC	0.000	1	0.196	0.661
QUINTIC	0.001	1	0.745	0.394
Residual	0.002	35		

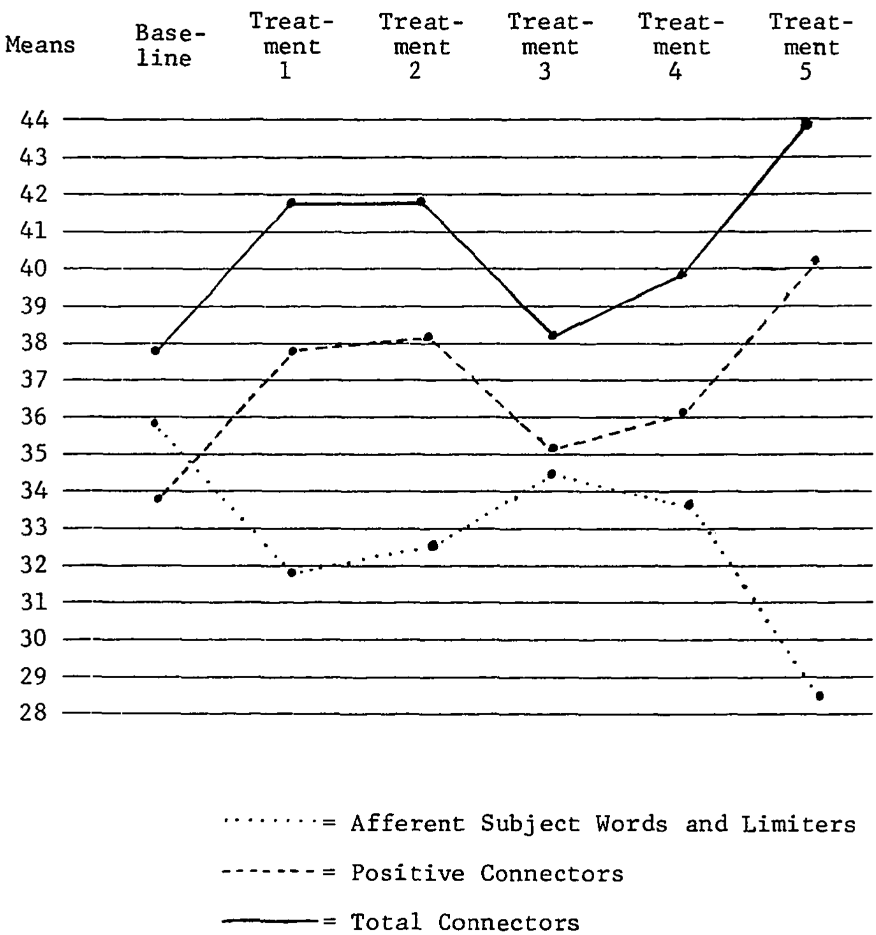
*Statistically significant.

Discussion

All of the above results may be classified as either supportive or nonsupportive of the systems schema proposed in chapter one. Failure to find interdependence of communication variables through nonsignificant findings seems to argue against the position taken in chapter one. Of the twenty-nine variables examined, twenty-four displayed a lack of significant relationships with the proxemic variable. These nonsignificant findings may be grouped into two categories. First, there were those variables that exhibited no significant group differences. These variables were vocalization/unfilled pause, simultaneous speech, rate, mean vocalization, vocalized pause, defined subject words, efferent subject limiters, comparison connectors, intransitive connectors, negative connectors, efferent subject words and limiters, subject words, future tense, primitive subject words and connectors, defined subject words, demonstratives, collectives and total words (TOT 3). Second, there were those variables having significant group differences but also having either significantly different baselines or non-significant trends. These included conversation reinforcers, action connectors, present tense connectors, subjunctive connectors and past tense connectors. These results do not support the author's position, despite their significant group differences. Two of these have differences traceable to stimuli other than the manipulation, while the other three would deny the author's claim of significant interrelationships between variables over time. Thus, the failure of the experimental induction to produce its desired effect in the majority of variables tested seems clear. Such failure to show significant change has some interesting implications for both the design of the study and the systems perspective (see chapter four).

Four variables displayed significant differences between experimental and control groups, baseline similarities, and significant experimental trends. These were afferent subject words and limiters, total limiters, positive connectors, and total connectors. Of these variables, all but limiters show significant cubic trends. A charting of these three cubic trends according to treatment means (see Figure 1) reveals clearly the effect of the experimental manipulation of these variables.

FIGURE 1



As noted in chapter two, such cubic functions would be expected of those variables directly related to the assumed induced stress. In all three variables, there seems to be the expected difference between baseline and treatment one. Such a difference would normally be anticipated if for no other reason than the initiation of the stimulus. Positive connectors, and total connectors seem directly related to spatial intrusion (see Figure 1, Treatment 3). Inverse effects were obtained for afferent subject words and limiters (see Figure 1, Treatment 3).

Such is not the case with the fourth variable, total limiters. An inverse linear trend was observed instead of a cubic trend. The expected probability of an incremental induction and reduction of stress did not occur. Quite likely the significant trend toward use of fewer limiters was a function of time and/or other uncontrolled variables, not the experimental manipulation.

One might conclude that a systemic relationship does exist between the proxemic and parts of the lexical subsystem. The cubic function displaying direct or inverse relations between the subsystems was found to exist in afferent subject words and limiters, positive connectors and total connectors. Some implications of these results are discussed in chapter four.

CHAPTER IV

IMPLICATIONS AND SUGGESTIONS FOR FURTHER STUDY

That human communication is a multivariate process was established as a theoretic given within the parameters of this research project. Initially the question was posed as to how one might explicate the mass of interrelations among the various communication behaviors. One means of answering such a question seemed to be through systematic manipulation of the behaviors under study. If the values of one behavior might be changed, consequent changes manifested in other behaviors should bespeak underlying systemic relations. In the study that was conducted, the types and nature of the changes occurring in the lexical and vocalic subsystems after manipulation of the proxemic provides information as to the nature of proxemic-lexical, proxemic-vocalic relations. This chapter will relate the results of the study conducted to the originally proposed systems paradigm. It will also note the implications of the results of this study for research design, possible future studies, and use of research equipment.

Systems Relationships

The research conducted indicated three lexical variables to be significantly related to proxemic variation. Total connectors and positive connectors showed a direct relation to the proxemic subsystem while afferent subject words and limiters displayed an inverse relation. On the basis of the above evidence some statements about the proxemic-lexical interrelations can be made. Certainly the proxemic and lexical subsystems are related, interdependent. The nature of this interdependence, however, is quite complex. First of all, interdependence between subsystems can evidently exist on any of several levels. One may speak of relationships between whole subsystems, between one subsystem and any of the components of another, and between any of the components of one subsystem and any of the components of another. Only three of the components of the lexical subsystem displayed significant relations to the proxemic. Subsystem to components interrelations were thus displayed. Doubtless any of the other two levels of relationship were possible. But the systems notion is further complicated by, second, variation among the components of a subsystem in regard to their relationships to another subsystem. For example, positive connectors and total connectors related to the proxemic subsystem in a direct way: as space decreased so did their frequency. However, afferent subject words and limiters, a component within the same subsystem, displayed an inverse relation to proxemics: as space decreased, its frequency increased. So not only may there be various levels of systemic relation, there can also be variation of types of relations displayed by components of one subsystem to the same object of relations. Thus, if one speaks of generating laws to predict the behavior of human communication systems, he must necessarily speak in terms of levels. One may evolve laws predicting subsystem, component, and/or subsystem-component behavior. It might also very well be, that as in quantum mechanics (Nagel, 1961), those investigating the human communication system may need to opt for various types of determinism, depending upon which systems level they discuss. Sutherland (1973) suggests that higher levels of systems may be very deterministic with the lower levels probabilistic. This may mean that the types of predictions made about whole systems may be qualitatively different from those made about their components. It certainly seems clear that the interrelationships among communicative behaviors are much more complex than had initially been thought. Regardless, only further research of the type conducted here can furnish the additional information needed to provide fuller understanding of the human communication system.

Evidence from the research conducted also allows some statements to be made about the proxemic-vocalic relationships. Despite the fact that no significant variation occurred due to the experimental manipulation in the components of the vocalic subsystem examined, one cannot conclude that no relationship exists between these two subsystems. Even several replications of these nonsignificant findings would not be sufficient grounds for acceptance of the null hypothesis. However, there is a related statement that can be made with assurity. Those lexical variables manifesting significance clearly exhibited a more direct relationship, under the experimental conditions, to the proxemic subsystem than did the vocalic variables examined. The systems worldview would reject the notion of "no relationship" advancing concepts of different types of relations in its stead. It is too easy to dichotomize the notion of interdependence among variables, that variables are or are not interdependent. Might there not exist varying degrees of interdependence among subsystems and components? One subsystem and/or its components might be more directly related to or interdependent with another subsystem than are other subsystems under scrutiny. Interdependence might well be seen as a continuum with no zero point. Furthermore the extent of interdependence among variables could also be seen to be a constant or perhaps contingent upon some situational variation. Indeed the interrelations among variables may even have a fixed range of values fluctuating according to the context in which the interactants are placed and their behaviors measured. Undoubtedly, a conclusion of no relationship between the proxemic and vocalic subsystems would be at best premature, at worst, antiscientific. Rather, one might ask whether a set of as yet undetected relations may be constructed which connect these two subsystems. Clearly many potential combinations of relationships exist between these, between all, subsystems of human communication. Only more extensive research can continue to unearth unsuspected truths and tell the behavioral scientist exactly how much he has yet to learn about the process of human communication.

Interpretation of Nonsignificant Findings

Within the list of nonsignificant results lie several lexical and vocalic variables linked by literature directly or indirectly to the independent variable. None of the obtained significant findings had a basis in prior literature. And yet all of the dependent variables linked by previous research either to spatial intrusion or anxiety failed to manifest results. Why did this occur? If stress exists as operationalized in the experimental manipulations in this study, then it was reflected by three lexical variables that behaved as predicted. If the manipulations produced stress, the root of the nonsignificant findings would thus seem to lie in why that stress was not manifested in other variables. As suggested earlier, the variables manifesting nonsignificance could hold different types of relations to the proxemic subsystem, as opposed to those variables producing significant results. This would account for the differential effects of the stress induction. However, several other explanations, rooted in methodological issues, also deserve close scrutiny. These are predicated on the possibility that the stress stimulus should have evoked responses in all variables but failed to do so because of methodological flaws. One possibility in this area would be that the intratrial period, designed to induce stress, was too short. While this offers a possible solution, it still seems inadequate in light of the fact that other experimenters, using even shorter intra-trial periods than those in this study (Baxter and Roselle, 1975), have "invaded" subjects' space and obtained responses on variables identical to those producing nonsignificance for the author. A more likely explanation stemming from methodological concerns would be that the experimental setting produced a low situational ambiguity in subjects which resulted in a lessening of their stress in a potentially stressful situation (i.e., invasion of space). Subjects in this study knew *a priori* that their space was to be invaded; they even knew why the invasion was occurring (see Appendices D and E). Thus the stress aroused in the expectedly stressful situation would have been decreased by subjects' understanding (low ambiguity) of the experimental (invasion) setting. This low situational ambiguity is in contrast to most of the studies of invasions of personal space in which a stranger in a field experimental setting moves closer (high ambiguity) to some subject. Such a situation as this may evoke more response than the laboratory setting.

From an attribution theory perspective the low ambiguity situation may have acted as a stress relief whereby the subject attributed the invasion of space to the laboratory setting. The high ambiguity situation may lead to stress production because the invasion is attributed to a person, rather than to the experiment. Bearing in mind these situational differences, one can note an interesting flaw in the personal space research. In most natural settings when one's space is invaded, situational ambiguity is apt to be low, not high. Most crowding occurs in an environment in which the individual can understand the reasons behind his loss of space (e.g., too many people riding on one elevator). The stress production of such events would certainly be lessened by one's knowledge of the situation surrounding the crowding. Adverse effects of spatial intrusion would be expected to increase as the length of invasion and/or the number of invasions increased over time. In contrast to the natural occurrences of the invasion are the experimental studies of crowding which have placed subjects in highly ambiguous unnatural settings and recorded numerous behavioral manifestations of stress. A failure to replicate many of these same behavioral manifestations in the present study suggests doubt about the validity and generalizability of previous research findings in this area. Some behavioral changes linked to invasion of space may be mere experimental artifacts, traceable only to the contrived induction setting from which they came. But other behavioral changes--valid indicants of stress caused by spatial intrusion--may be manifested in more natural invasion settings, only after a prolonged invasion experience. Clearly more research needs to be done using experimental settings that are more like the natural invasion settings, at least in terms of situational ambiguity.

Although not grounded in methodological concepts, an alternative explanation to those posed might be stated as the notion that the lexical behaviors manifesting significant change served to reduce overall systemic stress thereby eliminating any possible stress manifestations by other behaviors. This "release valve"-type explanation is unlikely if one accepts other research (Baxter and Rozelle, 1975, Garner, 1972) which has shown numerous kinesic, vocalic, and lexical behaviors to be occurring simultaneously, exhibiting stress induced through spatial intrusion.

Thus, it seems possible that the experimental setting was at least partially responsible for the failure of many variables in the study to manifest stress reaction. But the fact that some variables manifested stress as expected also gives credence to the notion that interrelations among subsystems and components should be viewed in degrees. Some variables in the study were more directly related to the proxemic subsystem than others, hence, they responded to induced stress as expected despite the low situational ambiguity of the experimental setting.

Design Implications

Several implications can be drawn about research design on the basis of the study conducted. First, this study serves to demonstrate the value of a control group. Had no control comparison been possible with this study, this research would have accepted spuriously significant trend results on seven dependent variables. But control/experimental comparisons enabled the experimenter to eliminate such false significance. Such comparisons, however, were not possible in other nonverbal research (e.g., Garner, 1972, and Sommer, 1959).

Second, baseline comparisons also enabled the experimenter to examine seemingly significant results and show them to be actually nonsupportive within the limits of the design. This occurred with two variables.

Third, the study that was conducted has shown that when one is dealing with variables not overtly manipulable by subjects, these same subjects may have an overt knowledge of what the experiment is about and still not create demand effects leading to Type I error. Individuals participating in the experiment that was conducted had to be told just prior to manipulation exactly what would happen to them in the process of the experiment. That most of the variables investigated produced nonsignificant results is testimony to the fact that such procedures did not yield excess Type I error demand characteristics. It must, however, be noted that the possibility of producing Type II error through induced demand effects still existed in the experiment.

A fourth implication has to do with the notion of process and its subsequent reflection in experimental design. Certainly scholars in communication research are concerned with process notions. Undoubtedly few will be in exact accord as to the way process is to be reflected in research. But hopefully researchers will try to incorporate the notion, their own notion of process, in their designs. This study espoused one view of process-change over time. The changes occurring between subsystems over time were analyzed. The design, repeated measures, over six trials, was an attempt to reflect the author's view of process.

Finally, the design of the study that was conducted may have reflected a low ambiguity invasion of space. Other research in personal space needs to opt for designs that are staged in more natural settings, i.e., low ambiguity.

Future Studies

The final area of implications has to do with establishing the next logical piece of research to follow the study that was conducted. To summarize the study that was conducted, its purpose was to find what equations best describe the relationship between the proxemic-vocalic and lexical subsystems of communication. The author found that on three of twenty-five lexical variables a cubic function best described the interrelationship mentioned. No significant relation was found between the proxemic-vocalic subsystems. The author posited that the overall lack of significance in his study arose from a failure to evoke sufficient stress in all variables across subjects.

The next study that needs to be done in this area must extend the high invasion (intra-trial) treatments for more than two minutes used in this experiment. Such an extension would increase precision in assessing the proxemic, vocalic, and lexical relations.

In addition, the next study should employ more subjects. One difficulty with the present study was its inability to examine lexical and vocalic interrelations because of small sample size. Larger numbers of subjects would allow more precise assessment of the interrelations. Thus, as well as determining the proxemic-lexical, proxemic-vocalic relations, one might also examine the lexical-vocalic subsystems and their interactive components. A goal of this future study would be to generate some specific equations noting the various weightings of verbal and nonverbal behaviors as they combine to produce one particular value. It is quite possible that few or none of the variables utilized in this study are accurate bivariate predictors. But if one can isolate the right combinations of verbal and nonverbal variables, he may be able to determine what combinations (multivariate) of variables are significantly related to stress manipulation. Thus, one might produce a set of regression equations, one verbal and one nonverbal which would reflect proxemic stress in dyadic communication.

Equipment

Certain problems exist with the use of the Voice-Activated Relay to measure nonverbal data. While this instrument is to be preferred to the stopwatch, its use as a precise measuring device is doubtful. The sensitivity settings on the machine are imprecise, leading to difficulty in replication of specific settings once changed. Due to varying voice levels it also is difficult to maintain one setting across all subjects. A computerized system like that of Jaffe and Feldstein (1970) would be preferable to the somewhat primitive Voice-Activated Relay.

Prior to this research, SLCA II's use had been confined to prescribed written or oral messages, e.g., speeches delivered in a classroom. This study constituted one of the first major tests of SLCA II in conversational analysis. A *post hoc* examination of this program's performance reveals it to be quite capable in analyzing the lexical dimension of human conversation. To the extent that the researcher can code adequately his subjects' lexical behaviors, he can secure an accurate rendering of their syntactic structure through SLCA II. For long conversations, such as those employed in this research, a computerized program such as SLCA II is a virtual necessity if content analysis is to be performed. The coding and analytic procedures would become monumental without such electronic assistance. One caution, however, must be stressed. A "conversation" consists of more than what SLCA II analyzes. As complete as SLCA II is, it does not pretend to deal with the many nonlexical behaviors which also provide critical input into any conversation. The researcher must realize what SLCA II is analyzing and what he can and cannot claim on the basis of his findings. To reduce a conversation to the output of SLCA II would be erroneous.

In any future study of the human communication system, the lexical subsystem can be accurately represented by SLCA II. For example, in the research proposed as "future studies", SLCA II could play a critical role in helping to determine the exact weighting of verbal behaviors as they combine with nonverbal to produce message impact. The precision of this program would allow the researcher to generate the equations needed to conduct such research. In addition, SLCA II and its ability to profile verbal behavior over time (Cummings and Renshaw, 1976) could portray well subsystem change and interaction. One could gauge the behavioral changes occurring as subsystems of individuals met, shaped, and countershaped each other (Renshaw, 1975). But regardless of the specific type of research conducted, SLCA II remains an invaluable tool for the operationalizing and analysis of the lexical subsystem.

Summary

This study was conducted to uncover relational patterns between the proxemic-vocalic and the proxemic-lexical subsystems of subjects with hopes of providing some insight as to the truth content of a pretheoretic systems schema. Three cubic relationships were obtained. One can conclude that certain lexical variables operate in close relation to the proxemic subsystem. In certain instances, the interrelations posed by the pretheoretic schema were confirmed. However, most of the variables investigated failed to display discernable interrelationships.

Certain changes in method and design are suggested so that a more accurate gauge of the verbal-nonverbal relationships can be had.

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APPENDIX A

Topics Generated

*1. Jimmy Carter's presidential platform

2. Will O.U. be number 1 again this year?

3. Each person's degree area or area of interest as far as occupation and career are concerned.

4. What is education?

5. Tuition hike

6. What do you feel about God?

7. Totally sexually integrated dormitories

8. Importance of football in relation to academics at O.U.

9. Is there a viable student government at O.U.?

10. Nominees for President and Vice President and the expected outcome of the election.

*11. Lebanon political situation

12. Should marijuana be legalized?

*13. Should Oklahoma re-establish the death penalty for certain crimes?

*14. Should Oklahoma legalize abortion?

15. Hobbies

16. How many brothers and sisters do you have? What effect have they had on you?

17. Most important factors voters look for at the polls

18. Possibility of life on other planets

19. Who will you vote for in the Presidential election and why?

20. Housing situation in Norman in the summer

*21. Something exciting you've done this summer

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*These were the topics randomly selected to be rank ordered by Ss.

APPENDIX B

Topics to be Rank Ordered

Instructions: Below are listed five possible topics for a two person conversation. Rank order these topics, from one to five, in terms of how important they are to you. Number one should be the most important, number two the second most important, and so on, with number five being the least important.

Topics	Rank
1. Jimmy Carter's presidential platform	______
2. Lebanon political situation	______
3. Should Oklahoma re-establish the death penalty for certain crimes	______
4. Should Oklahoma legalize abortion	______
5. Something exciting you've done this summer	______

APPENDIX C

Results of Topic Rank Ordering

	RANK				
	1	2	3	4	5
TOPIC					
1	10.25%	12.82%	20.51%	*43.58%	12.82%
	n=4	n=5	n=8	n=17	n=5
2	12.82%		12.82%	23.07%	*51.28%
	n=5	n=0	n=5	n=9	n=20
3	*30.76%	38.46%	17.94%	10.25%	2.56%
	n=12	n=15	n=7	n=4	n=1
4	25.64%	*28.20%	23.07%	10.25%	12.82%
	n=10	n=9	n=9	n=4	n=5
5	20.51%	20.51%	*25.64%	12.82%	20.51%
	n=8	n=8	n=10	n=5	n=8

N=39

*=topic selected to be the first, second, third, fourth or fifth ranked among the choices.

APPENDIX D

Subject Consent Forms

I am studying the relationship between physical distance and conversation. You will be asked to be paired with another person and converse with them for approximately twelve minutes. During this time I will be taping the conversation. On occasion during your conversation I will vary the seating distance between you and your partner. All data that I gather will be kept strictly confidential. You will not be penalized for not participating in this study but your help will generate much needed knowledge about human communication.

I will be responsible for debriefing you either at your convenience or in your 1113 class at some time after the data is all gathered.

I, the undersigned, agree to participate as a subject in the above experiment.

Signed ______________________________

APPENDIX E

Instructions to Subjects

In the course of this experiment I will give you two topics to stimulate your conversation. The first topic is for a short conversation at the first of the experimental period, the second topic is for the rest of the experiment. Try to stay on the given topic in each period. But if you feel the conversation becoming awkward, you may change to the topic of your choice at any time. Once the experiment begins, I will not converse with you.

1. Experimental Subjects:
   a. Place these chairs, offset, facing each other at a distance you find comfortable for conversation. Once you have positioned your chairs, do not move them. Your topic for this conversation is: (Give the one randomly chosen from the four topics left.)
   b. Now begin another segment of the experiment. I will place your chairs at this starting point. Once the chairs are in position do not move them. Your topic for this longer conversation is: Should Oklahoma re-establish the death penalty for certain crimes? Occasionally in the next few minutes during your conversation I will move the chair on my left. So you will need to rise that I might move it. Again, once the chairs are in position do not move them. Do you understand?

2. Control Subjects:

   a. I have placed your chairs in this starting point. Once the chairs are in position, do not move them. Your topic for this conversation period is: (Give the one randomly chosen from the four topics left.)

   b. Now begins another segment of the experiment. Occasionally in the next few minutes I will interrupt your conversation. We will pause and you may continue your conversation at the onset of taping. Your topic for this longer conversation is: Should Oklahoma re-establish the death penalty for certain crimes? Do you understand?

APPENDIX F

Proportion of Agreement--Combined Channels

Dyad (combined channels)	Judge 1	Judge 2	E	% agreement
1	2	1	1	50%
2	1	1	1	100%
3	2	2	2	100%
4	2	1	1	50%
5	2	1	1	50%
6	2	1	1	0%
7	2	1	1	50%
8	1	2	1	50%
9	2	2	1	0%
10	2	1	1	50%
11	2	1	1	50%
12	2	2	1	0%
13	2	2	2	100%
14	2	2	2	100%
15	2	2	2	100%
16	2	2	2	100%
				950
				$\bar{x}$=59.38%

1=setting 1

2=setting 2

3=setting 3

APPENDIX G

Proportion of Agreement--Channel A

Person A (single channel)	Judge 1	Judge 2	E	% agreement
1	3	3	3	100%
2	3	3	3	100%
3	3	3	2	0%
4	3	2	3	50%
5	3	2	3	50%
6	3	2	3	50%
7	3	3	3	100%
8	3	2	3	50%
9	3	2	3	50%
10	3	2	3	50%
11	3	2	3	50%
12	3	3	3	100%
13	3	3	3	100%
14	3	3	3	100%
15	3	3	3	100%
16	3	3	3	100%
				1150
				$\bar{x}$=71.87%

APPENDIX H

Proportion of Agreement--Channel B

Person B (single channel)	Judge 1	Judge 2	E	% agreement
1	2	2	2	100%
2	2	2	2	100%
3	2	2	2	100%
4	3	2	2	50%
5	2	2	3	0%
6	2	1	2	50%
7	2	1	1	50%
8	2	1	2	50%
9	2	2	2	100%
10	2	1	2	50%
11	2	1	2	50%
12	2	2	2	100%
13	2	2	2	100%
14	2	2	2	100%
15	2	2	2	100%
16	2	2	2	100%
				1200
				$\bar{x}$=75.00%

APPENDIX I

Analysis of Variance and Means for Vocalization

Unfilled Pause

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	115.9841	115.9841	1	0.1241	0.7290
Group Error	13080.5742	934.3267	14		
Treatment	568.8777	113.7755	5	3.1095	0.0136*
Treatment by Group	168.4553	33.6911	5	0.9108	0.5258
Treatment by Group Error	2561.2478	36.5892	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	57.3937**	1	51.0625	1	50.4500	1	51.6750
2	55.1954	2	57.5431	2	57.8787	2	57.2075
		3	57.6662	3	58.6487	3	56.6837
		4	57.1512	4	58.6387	4	55.6637
		5	56.0619	5	59.7500	5	52.3737
		6	58.2825	6	68.9962	6	57.5687

**These are all vocalization means. Pause means are obtained by subtracting each of these given values from 120.00.

APPENDIX J

Analysis of Variance and Means for Simultaneous Speech

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	346.6457	346.6357	1	3.2660	0.0895
Group Error	1485.9065	106.1362	14		
Treatment	117.6912	23.5382	5	1.4327	0.2224
TreatmentxGroup	116.4150	23.2830	5	1.4172	0.2279
Treatment x Group Error	1150.0310	16.4290	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	9.6754	1	6.2525	1	7.4562	1	5.0487
2	5.8750	2	8.2419	2	9.8712	2	6.6125
		3	9.4169	3	10.4875	3	8.3462
		4	8.6206	4	12.3362	4	4.9050
		5	7.4987	5	10.5587	5	4.4387
		6	6.6206	6	7.3425	6	5.8987

APPENDIX K

Analysis of Variance and Means for Rate

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.1403	0.1403	1	0.0962	0.7582
Group Error	20.4131	1.4581	14		
Treatment	0.3956	0.0791	5	0.9191	0.5247
TreatmentxGroup	0.5897	0.1179	5	1.3699	0.2453
Treatment x Group Error	6.0264	0.0861	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	2.9917	1	2.9469	1	2.7687	1	3.1250
2	3.0681	2	3.0406	2	2.9475	2	1.1337
		3	3.0262	3	2.9825	3	3.0700
		4	3.0200	4	3.0562	4	2.9837
		5	2.9894	5	3.0337	5	2.9450
		6	3.1562	6	3.1612	6	3.1512

APPENDIX L

Analysis of Variance and Means for Mean Vocalization

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	10.3425	10.3425	1	0.0936	0.7612
Group Error	1546.8030	110.4859	14		
Treatment	182.2239	36.4448	5	0.5560	0.7356
TreatmentxGroup	328.2404	65.6841	5	1.0020	0.4239
Treatment x Group Error	4588.5000	65.5500	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	8.8506	1	6.8237	1	7.5412	1	6.1062
2	8.1942	2	7.8381	2	6.2275	2	9.4487
		3	8.3450	3	7.6037	3	9.0862
		4	10.0294	4	9.9550	4	10.1037
		5	7.4400	5	6.9612	5	7.9187
		6	10.6581	6	14.8150	6	6.5012

APPENDIX M

Analysis of Variance and Means for Vocalized Pause

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0059	0.0059	1	0.8023	0.618
Group Error	0.1037	0.0074	14		
Treatment	0.0033	0.0007	5	0.9569	0.5485
TreatmentxGroup	0.0050	0.0010	5	1.4482	0.2171
Treatment x Group Error	0.0486	0.0007	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0418	1	0.0305	1	0.0315	1	0.0295
2	0.0261	2	0.0454	2	0.0673	2	0.0235
		3	0.0298	3	0.0366	3	0.0229
		4	0.0371	4	0.0480	4	0.0261
		5	0.0278	5	0.0281	5	0.0275
		6	0.0331	6	0.0393	6	0.0269

APPENDIX N

Analysis of Variance and Means for Defined Subject Words

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0027	0.0027	1	3.4528	0.0814
Group Error	0.0108	0.0008	14		
Treatment	0.0026	0.0005	5	1.0520	0.3948
TreatmentxGroup	0.0008	0.0002	5	0.3443	0.8843
Treatment x Group Error	0.0344	0.0005	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0775	1	0.0723	1	0.0771	1	0.0676
2	0.0670	2	0.0645	2	0.0679	2	0.0610
		3	0.0691	3	0.0774	3	0.0608
		4	0.0478	4	0.0798	4	0.0698
		5	0.0713	5	0.0808	5	0.0618
		6	0.0814	6	0.0820	6	0.0808

APPENDIX O

Analysis of Variance and Means for Efferent Subject Limiters

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0002	0.0002	1	0.0696	0.7911
Group Error	0.0311	0.0022	14		
Treatment	0.0019	0.0004	5	0.4612	0.8053
TreatmentxGroup	0.0021	0.0004	5	0.5025	0.7753
Treatment x Group Error	0.0578	0.0008	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.1389	1	0.1438	1	0.1391	1	0.1484
2	0.1364	2	0.1310	2	0.1342	2	0.1279
		3	0.1339	3	0.1388	3	0.1290
		4	0.1420	4	0.1420	4	0.1423
		5	0.1360	5	0.1443	5	0.1278
		6	0.1390	6	0.1351	6	0.1428

APPENDIX P

Analysis of Variance and Means for Comparison Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0003	0.0003	1	0.1707	0.6877
Group Error	0.0224	0.0016	14		
Treatment	0.0093	0.0019	5	3.5327	0.0068*
TreatmentxGroup	0.0014	0.0003	5	0.5509	0.7394
Treatment x Group Error	0.0368	0.0005	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0754	1	0.0577	1	0.0594	1	0.0560
2	0.0720	2	0.0908	2	0.0946	2	0.0871
		3	0.0779	3	0.0713	3	0.0844
		4	0.0705	4	0.0749	4	0.0662
		5	0.0734	5	0.0785	5	0.0683
		6	0.0719	6	0.0719	6	0.0702

APPENDIX Q

Analysis of Variance and Means for Indicative Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0220	0.0220	1	4.3822	0.0526
Group Error	0.0703	0.0050	14		
Treatment	0.0180	0.0036	5	2.9564	0.0175*
TreatmentxGroup	0.0143	0.0029	5	2.3570	0.0484*
Treatment x Group Error	0.0850	0.0012	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.3771	1	0.3663	1	0.3559	1	0.3767
2	0.4074	2	0.4006	2	0.3846	2	0.4166
		3	0.4063	3	0.3908	3	0.4219
		4	0.3826	4	0.3594	4	0.4059
		5	0.3973	5	0.3645	5	0.4300
		6	0.4002	6	0.4073	6	0.3931

APPENDIX R

Analysis of Variance and Means for Transitive Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0098	0.0098	1	3.9929	0.0628
Group Error	0.0344	0.0025	14		
Treatment	0.0122	0.0024	5	1.5262	0.1920
TreatmentxGroup	0.0109	0.0022	5	1.3599	0.2491
Treatment x Group Error	0.1120	0.0016	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.2213	1	0.2124	1	0.2186	1	0.2063
2	0.2415	2	0.2449	2	0.2279	2	0.2620
		3	0.2406	3	0.2328	3	0.2484
		4	0.2214	4	0.2115	4	0.2313
		5	0.2373	5	0.2092	5	0.2655
		6	0.2318	6	0.2279	6	0.2357

APPENDIX S

Analysis of Variance and Means for Intransitive Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0141	0.0141	1	3.2286	0.0909
Group Error	0.0612	0.0044	14		
Treatment	0.0076	0.0015	5	1.1041	0.3662
TreatmentxGroup	0.0074	0.0015	5	1.0742	0.3824
Treatment x Group Error	0.0960	0.0014	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.1847	1	0.1807	1	0.1602	1	0.2012
2	0.2090	2	0.1949	2	0.1915	2	0.1983
		3	0.2038	3	0.1868	3	0.2208
		4	0.1929	4	0.1704	4	0.2154
		5	0.2004	5	0.1898	5	0.2111
		6	0.2084	6	0.2097	6	0.2071

APPENDIX T

Analysis of Variance and Means for Negative Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0023	0.0023	1	4.3335	0.0537
Group Error	0.0074	0.0005	14		
Treatment	0.0024	0.0005	5	1.1351	0.3499
TreatmentxGroup	0.0012	0.0002	5	0.5429	0.7454
Treatment x Group Error	0.0298	0.0004	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0373	1	0.0494	1	0.0400	1	0.0589
2	0.0471	2	0.0458	2	0.0438	2	0.0478
		3	0.0510	3	0.0389	3	0.0431
		4	0.0360	4	0.0290	4	0.0429
		5	0.0448	5	0.0365	5	0.0531
		6	0.0360	6	0.0335	6	0.0366

APPENDIX U

Analysis of Variance and Means for Efferent Subject Words and Limiters

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0001	0.0001	1	0.0221	0.8784
Group Error	0.0876	0.0063	14		
Treatment	0.0068	0.0014	5	0.8663	0.5096
TreatmentxGroup	0.0033	0.0007	5	0.4154	0.8374
Treatment x Group Error	0.1101	0.0016	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.2647	1	0.2718	1	0.2618	1	0.2817
2	0.2623	2	0.2556	2	0.2606	2	0.2050
		3	0.2509	3	0.2543	3	0.2475
		4	0.2638	4	0.2724	4	0.2552
		5	0.2639	5	0.2626	5	0.2651
		6	0.2751	6	0.2765	6	0.2737

APPENDIX V

Analysis of Variance and Means for Subject Words

APPENDIX V

Analysis of Variance and Means for Subject Words

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0054	0.0054	1	3.4949	0.0797
Group Error	0.0216	0.0015	14		
Treatment	0.0138	0.0028	5	3.2041	0.0116*
TreatmentxGroup	0.0035	0.0007	5	0.8199	0.5411
Treatment x Group Error	0.0601	0.0009	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.1506	1	0.1429	1	0.1439	1	0.1420
2	0.1356	2	0.1230	2	0.1324	2	0.1135
		3	0.1360	3	0.1382	3	0.1338
		4	0.1525	4	0.1639	4	0.1411
		5	0.1433	5	0.1613	5	0.1253
		6	0.1608	6	0.1638	6	0.1578

APPENDIX W

Analysis of Variance and Means for Future Tense Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0012	0.0012	1	2.5990	0.1043
Group Error	0.0058	0.0004	14		
Treatment	0.0013	0.0003	5	0.7835	0.5667
TreatmentxGroup	0.0015	0.0003	5	0.8963	0.5100
Treatment x Group Error	0.0236	0.0003	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0279	1	0.0248	1	0.0292	1	0.0204
2	0.0350	2	0.0334	2	0.0294	2	0.0374
		3	0.0368	3	0.0338	3	0.0397
		4	0.0295	4	0.0219	4	0.0371
		5	0.0331	5	0.0293	5	0.0369
		6	0.0312	6	0.0239	6	0.0386

APPENDIX X

Analysis of Variance and Means for Primitive Subject Words and Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0254	0.0254	1	3.3624	0.0851
Group Error	0.1059	0.0076	14		
Treatment	0.0565	0.0113	5	3.0152	0.0159*
TreatmentxGroup	0.0085	0.0017	5	0.4530	0.8119
Treatment x Group Error	0.2621	0.0037	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.3653	1	0.3375	1	0.3261	1	0.3489
2	0.3979	2	0.3689	2	0.3640	2	0.3738
		3	0.3897	3	0.3582	3	0.4212
		4	0.3831	4	0.3575	4	0.4087
		5	0.3943	5	0.3786	5	0.4100
		6	0.4161	6	0.4075	6	0.4248

APPENDIX Y

Analysis of Variance and Means for Defined Subject Words

Source	Sum of Squares	Mean Squares	DF	F-Ratio	P
Group	0.0002	0.0002	1	0.2526	0.6278
Group Error	0.0130	0.0009	14		
Treatment	0.0026	0.0005	5	0.7069	0.6224
TreatmentxGroup	0.0037	0.0007	5	0.9966	0.5728
Treatment x Group Error	0.0524	0.0007	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.1913	1	0.1986	1	0.1965	1	0.2006
2	0.1882	2	0.1940	2	0.1880	2	0.2001
		3	0.1906	3	0.1995	3	0.1818
		4	0.1837	4	0.1883	4	0.1791
		5	0.1868	5	0.1818	5	0.1919
		6	0.1849	6	0.1940	6	0.1758

APPENDIX Z

Analysis of Variance and Means for Demonstratives

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0009	0.0009	1	0.8969	0.6378
Group Error	0.0146	0.0010	14		
Treatment	0.0135	0.0027	5	3.4735	0.0075*
TreatmentxGroup	0.0020	0.0004	5	0.5114	0.7687
Treatment x Group Error	0.0544	0.0008	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0918	1	0.0745	1	0.0776	1	0.0715
2	0.0855	2	0.1039	2	0.1088	2	0.0990
		3	0.0824	3	0.0773	3	0.0875
		4	0.0838	4	0.0916	4	0.0760
		5	0.0814	5	0.0815	5	0.0812
		6	0.1059	6	0.1138	6	0.0979

APPENDIX AA

Analysis of Variance and Means for Collectives

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0000	0.0000	1	0.1464	0.70840
Group Error	0.0033	0.0002	14		
Treatment	0.0013	0.0003	5	1.0771	0.38086
TreatmentxGroup	0.0008	0.0002	5	0.7094	0.62065
Treatment x Group Error	0.0164	0.0002	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0270	1	0.0253	1	0.0291	1	0.0215
2	0.0258	2	0.0271	2	0.0238	2	0.0304
		3	0.0209	3	0.0194	3	0.0225
		4	0.0255	4	0.0249	4	0.0261
		5	0.0332	5	0.0383	5	0.0282
		6	0.0264	6	0.0267	6	0.0261

APPENDIX BB

Analysis of Variance and Means for TOT-3

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	1.0417	1.0417	1	0.0002	0.9851
Group Error	62537.2891	4466.9492	14		
Treatment	1668.3333	333.6665	5	0.9754	0.5599
TreatmentxGroup	2718.7058	543.7410	5	1.5895	0.1735
Treatment x Group Error	23945.8789	342.0840	70		

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	172.2292	1	178.0625	1	171.0000	1	185.1250
2	172.4375	2	167.8125	2	163.6250	2	172.0000
		3	178.1875	3	174.2500	3	182.1250
		4	169.8750	4	176.1250	4	163.6250
		5	170.2500	5	177.0000	5	163.5000
		6	169.8125	6	171.3750	6	168.2500

APPENDIX CC

Analysis of Variance and Means for Conversation Reinforcers

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0041	0.0041	1	5.4252	0.0336*
Group Error	0.0106	0.0008	14		
Treatment	0.0005	0.0001	5	0.5566	0.7352
TreatmentxGroup	0.0008	0.0002	5	0.9325	0.5332
Treatment x Group Error	0.0115	0.0002	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0225	1	0.0306	1	0.0187	1	0.0426
2	0.0356	2	0.0290	2	0.0249	2	0.0330
		3	0.0304	3	0.0259	3	0.0349
		4	0.0244	4	0.0184	4	0.0303
		5	0.0293	5	0.0209	5	0.0377
		6	0.0305	6	0.0261	6	0.0349

APPENDIX DD

Analysis of Variance and Means for Action Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0549	0.0549	1	15.3837	0.0018*
Group Error	0.0499	0.0036	14		
Treatment	0.0150	0.0030	5	1.4603	0.2130
TreatmentxGroup	0.0166	0.0033	5	1.6191	0.1655
Treatment x Group Error	0.1439	0.0021	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.3307	1	0.3355	1	0.3193	1	0.3516
2	0.3785	2	0.3491	2	0.3251	2	0.3731
		3	0.3665	3	0.3482	3	0.3848
		4	0.3437	4	0.3070	4	0.3805
		5	0.3644	5	0.3204	5	0.4083
		6	0.3683	6	0.3639	6	0.3726

APPENDIX EE

Analysis of Variance and Means for Subjunctive Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0048	0.0048	1	5.8890	0.0278*
Group Error	0.0114	0.0008	14		
Treatment	0.0025	0.0005	5	1.0112	0.4184
TreatmentxGroup	0.0005	0.0001	5	0.2260	0.9487
Treatment x Group Error	0.0341	0.0005	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0290	1	0.0268	1	0.0229	1	0.0308
2	0.0431	2	0.0394	2	0.0437	2	0.0437
		3	0.0380	3	0.0288	3	0.0473
		4	0.0317	4	0.0226	4	0.0409
		5	0.0405	5	0.0345	5	0.0464
		6	0.0400	6	0.0303	6	0.0497

APPENDIX FF

Analysis of Variance and Means for Afferent Subject Words and Limiters

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0425	0.0425	1	10.9761	0.0052*
Group Error	0.0542	0.0039	14		
Treatment	0.0252	0.0050	5	1.6881	0.1480
TreatmentxGroup	0.0131	0.0026	5	0.8730	0.5051
Treatment x Group Error	0.2093	0.0030	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.3292	1	0.3349	1	0.3594	1	0.3104
2	0.2871	2	0.3047	2	0.3197	2	0.2897
		3	0.3047	3	0.3261	3	0.2832
		4	0.3218	4	0.3457	4	0.2980
		5	0.2981	5	0.3383	5	0.2579
		6	0.2847	6	0.2859	6	0.2834

APPENDIX GG

Analysis of Variance and Means for Limiters

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0208	0.0208	1	4.8753	0.0423*
Group Error	0.0597	0.0043	14		
Treatment	0.0382	0.0076	5	3.6273	0.0058*
TreatmentxGroup	0.0061	0.0012	5	0.5811	0.7168
Treatment x Group Error	0.1475	0.0021	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.4433	1	0.4639	1	0.4773	1	0.4504
2	0.4139	2	0.4370	2	0.4479	2	0.4261
		3	0.4196	3	0.4422	3	0.3970
		4	0.4331	4	0.4542	4	0.4121
		5	0.4189	5	0.4397	5	0.3982
		6	0.3989	6	0.3986	6	0.3993

APPENDIX HH

Analysis of Variance and Means for Past Tense Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0107	0.0107	1	6.4151	0.0227*
Group Error	0.0234	0.0017	14		
Treatment	0.0055	0.0011	5	1.4152	0.2286
TreatmentxGroup	0.0042	0.0008	5	1.0962	0.3704
Treatment x Group Error	0.0542	0.0008	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.0666	1	0.0575	1	0.0688	1	0.0462
2	0.0455	2	0.0479	2	0.0669	2	0.0290
		3	0.0456	3	0.0497	3	0.0415
		4	0.0600	4	0.0598	4	0.0603
		5	0.0683	5	0.0839	5	0.0526
		6	0.0568	6	0.0704	6	0.0431

APPENDIX II

Analysis of Variance and Means for Present Tense Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0813	0.0813	1	11.4259	0.0046*
Group Error	0.0097	0.0071	14		
Treatment	0.0328	0.0066	5	2.6274	0.0305*
TreatmentxGroup	0.0152	0.0030	5	1.2132	0.3115
Treatment x Group Error	0.1749	0.0025	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.3118	1	0.3108	1	0.2807	1	0.3409
2	0.3700	2	0.3586	2	0.3233	2	0.3939
		3	0.3619	3	0.3360	3	0.3879
		4	0.3254	4	0.3015	4	0.3493
		5	0.3364	5	0.2858	5	0.3870
		6	0.3522	6	0.3433	6	0.3610

APPENDIX JJ

Analysis of Variance and Means for Positive Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0289	0.0289	1	5.3145	0.0351*
Group Error	0.0762	0.0054	14		
Treatment	0.0416	0.0083	5	6.2902	0.0001*
TreatmentxGroup	0.0104	0.0021	5	1.5685	0.1795
Treatment x Group Error	0.0925	0.0013	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.3688	1	0.3437	1	0.3388	1	0.3486
2	0.4035	2	0.3941	2	0.3758	2	0.4125
		3	0.4034	3	0.3807	3	0.4261
		4	0.3784	4	0.3529	4	0.4038
		5	0.3903	5	0.3625	5	0.4234
		6	0.4043	6	0.4020	6	0.4066

APPENDIX KK

Analysis of Variance and Means for Total Connectors

Source	Sum of Squares	Mean Square	DF	F-Ratio	P
Group	0.0473	0.0473	1	6.9505	0.0186*
Group Error	0.0953	0.0068	14		
Treatment	0.0328	0.0066	5	3.5287	0.0068*
TreatmentxGroup	0.0133	0.0027	5	1.4332	0.2223
Treatment x Group Error	0.1303	0.0019	70		

*Statistically significant

Group		Treatment		Group 1 by Treatment		Group 2 by Treatment	
1	0.4061	1	0.3932	1	0.3788	1	0.4076
2	0.4505	2	0.4398	2	0.4196	2	0.4599
		3	0.4444	3	0.4196	4	0.4467
		4	0.4143	4	0.3819	4	0.4467
		5	0.4378	5	0.3990	5	0.4765
		6	0.4402	6	0.4376	6	0.4429