DETECTING DECEPTION: THE ROLE OF VARIOUS FORMS OF INFORMATION

Thesis for the Degree of M. A.

MICHIGAN STATE UNIVERSITY

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1976

ABSTRACT

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By

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The research examined the relationship between untrained observers' accuracy in detecting deception on the part of strangers, and available total and nonverbal information as a function of transmission channel. Twelve subjects were put through a deception inducing manipulation procedure almost identical to the one used by Exline et al. (1970) and Shulman (1973). This procedure yielded six subjects lying and six subjects telling the truth in a post-procedure interview. Eighty observers viewed these subjects either live through a one-way mirror, saw them on a videotape, heard them on an audiotape, or read a transcript of the interview. Observers reported whether they thought each subject was lying or telling the truth. Trained coders provided ratio-scaled estimates of how much total and nonverbal information was available when viewing each subject through each channel. The results indicate no significant relationship between amounts of available nonverbal and/or total information and the accuracy with which untrained observers detect deception on the part of strangers.

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Communication

1976

Accepted by the faculty of the Department of Communication, College of Communication Arts and Sciences, Michigan State University, in partial fulfillment of the requirements for the Master of Arts degree.

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Director of Thesis

Guidance Committee: ______________________, Chairman

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ACKNOWLEDGMENTS

This research was possible due to the work and commitment of a large number of people.

Special thanks goes to Dr. Gerald R. Miller whose expenditure of time, energy, and resources made this whole project possible. Dr. Edward L. Fink and Dr. Katrina W. Simmons contributed endless hours considering both methodological and theoretical issues involved in this research.

Several of my colleagues also served as resource persons, volunteering both time and ideas. David Randall Brandt shared many hours of pain as the study developed. Dr. John Hocking deserves special recognition for instilling a true appreciation of excellence in research in a co-worker. Frank Boster contributed both insight and psychological support at times when they were both sorely needed.

My parents, Seena and Arthur Bauchner, deserve much credit for creating a home where scholarship was valued, and achievement equally rewarded, regardless of sex.

Not to be overlooked is the moral support coming from a number of friends and colleagues, Terrance Albrecht, James Taylor, and Laura Henderson. These people gave of themselves in ways far beyond the call of duty.

Finally, special thanks goes to Dr. Richard W. Budd. His guidance and concern has made this and countless other efforts possible. He has earned the respect few educators ever receive.

I owe whatever knowledge I have gained from this endeavor to these individuals. Unfortunately the faults of this work are my own.

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CHAPTER I

REVIEW OF THE LITERATURE

Introduction

Regardless of whether social scientists view communication as the process by which people relate themselves to their environment (Budd and Ruben, 1972), "an intentional, transactional, symbolic process" (Miller and Steinberg, 1975, p. 33), or as "anything to which people can attach meaning" (Berlo, 1960, p. 2), the concept encompasses some form of attribution by the receiver concerning the source and/or the message. Whenever people engage in communication, they make evaluations about other participants in the interaction. Attributions of wealth, intelligence, intent, and guilt affect the interactions in which they take part (Maselli and Altrochi, 1969; Miller and Steinberg, 1975).

One attribution present in all interactions concerns the honesty or credibility of the source. Regardless of the information being transferred, the receiver decides: 1) whether or not the information in the message is reliable, and 2) whether or not the source believes the information (s)he has sent is credible, i.e., whether or not the intent of the source is deception. Sometimes these evaluations take place at an non-conscious level, but nevertheless they are made. In extreme forms this attribution entails the receiver accepting both the message as reliable and the source as honest (a truth attribution) or rejecting the message as unreliable and the source as intentionally providing false information (a deception attribution). Various degrees of this truth/deception attribution face individuals in all aspects of daily life; however, in its extreme form, this attribution has severe impact on the communication behaviors in a number of crucial situations: marital affairs, job interviews, labor negotiations, international diplomacy, and litigation. These broad implications have lead behavioral scientists to study the truth/deception attribution in various contexts and under various names. Studies have examined characteristics of credible sources (Berlo, Lemert, and Mertz, 1969), the ability to detect deception during one-to-one interviews (Maier and Thurber, 1968), and characteristics of deceivers and non-deceivers in dyadic interactions (Knapp, Hart, and Dennis, 1974). Due to the variety of unrelated situations, measurement techniques, and experimental manipulations employed in examining deceptive communication, knowledge of the phenomenon remains limited, disorganized, and ambiguous. Knapp _et_ _al_. recently noted that "given the pervasive nature and potential influence of our penchant to fabricate, it is surprising how little we know about lying. At this point in time, almost any systematic study of deception must be labeled 'exploratory'" (p. 16).

The purpose of this study is to add to the growing body of knowledge concerning the communication process surrounding truth/deception attributions by beginning to answer the question: What effect does the type and amount of information provided by a source have on the accuracy of the truth/deception attribution made by the receiver? The first chapter of this paper discusses the theory and literature surrounding this question and presents the model of the process which was tested. The second chapter presents experimental procedures used in answering this question. The third chapter presents the results and analysis of the experimental data. The final chapter discusses the findings and their implications in terms of future communication research.

Literature Review and Problem Conceptualization

The efforts of behavioral scientists who have attempted to examine deceptive communication empirically can be divided into three basic study groupings. The first group of studies represents attempts to determine the degree to which physiological indicators can accurately herald deception (Landis and Wiley, 1926; Dearman and Smith, 1963; Gustafson and Orne, 1963b; Davidson, 1968). Since only the physiological differences between deceivers and non-deceivers were examined, the findings of these studies offer little information concerning the accuracy of and basis for the truth/deception attribution.

Therefore, this first group of studies will be considered only in terms of procedural problems of dealing empirically with deception.

The second group of studies represents attempts to determine the behavioral correlates of lying (English, 1926; Berrien and Huntington, 1943; Ekman and Friesen, 1969; Matarazzo, Wiens, Jackson, and Janaugh, 1970; Mehrabian, 1971; Horvath, 1973; Knapp *et al.*, 1974). This second group, though also falling short of dealing with the truth/deception attribution in terms of an interaction between sender and receiver, offers some indication as to what type of information provided by a sender might lead to an accurate truth/deception attribution. This literature will also be considered in terms of procedural and conceptual problems connected with examining deception empirically.

The third group of studies represents attempts to identify the degree to which and under what conditions an untrained observer can accurately make a truth/deception attribution (Fay and Middleton, 1941; Hildreth, 1953; Maier and Thurber, 1968; Shulman, 1973; Ekman and Friesen, 1974; Hocking, Bauchner, Miller and Kaminski, 1976). This third group provides the most useful findings concerning an interaction between a sender and receiver in terms of the truth/deception attribution, in addition to procedural and experimental guidance in dealing with deception experimentally.

Based on these three groups of studies, attribution theory and some information processing considerations, the basis for this study is presented as follows: 1) an explication of the domain to which the study refers as the truth/deception attribution; 2) on the basis of previous work, a discussion of the problem and resultant model which is tested; and 3) a discussion of some procedural problems with previous truth/deception research which served as a basis for establishing procedures in the present study.

The Scope of Concern

Before examining further the problem of the truth/deception attribution, a clear definition of "deceptive communication" is needed. For the purposes of this study, deceptive communication refers to the withholding of spontaneous behavior and/or the substitution of simulative behavior by a source, with the intention of creating beliefs in a receiver which the source recognizes as false or invalid; the source must consider the success of the creation of this false belief as important to his/her well being. The centrality of the intentionality and importance criteria to the definition can be explained through attribution theory and the work of Ekman and Friesen.

As mentioned earlier, truth/deception evaluations are one possible attribution which receivers make concerning sources. According to Jones and Davis (1965) the attribution process can be understood in terms of a number of fundamental components. Jones and Davis state that before a receiver makes an attribution (s)he must perceive intention on the part of the source. This presupposes that the receiver believes the source was aware of his/her actions and that they would have the resultant effect; Jones and Davis refer to these presuppositions as knowledge and consider them necessary factors for intention. Another factor necessary for intention is ability, or more precisely, the receiver's judgment of the source's capacity to bring about the observed effects. In this thesis these preconditions exist for all situations involving deceptive communication.

Sometimes sources unknowingly provide false information; as a result the receiver may feel that an honest source is just misinformed. In the sense that false information has been provided the source has lied. Yet, in terms of the preconditions set down for the attribution process, this form of "lying" is not deceptive communication. At a practical level this distinction means that certain cases are beyond our focus: the behavior of the negotiator who deliberates in good faith only to have management stray from the agreed-upon policy, the politicians who obtain votes by making inaccurate statements and giving false impressions which they themselves believe, or the diplomat who deals with his colleagues in good faith, only to have government officials surprise him with new policies. Even if, in these cases, the receiver attributed deception to the sources, the phenomena would still not be deceptive communication; lack of intention eliminates them from the domain being considered.

Factors which lead to the truth/deception attribution may take various forms: past knowledge on the topic of discussion, personal distrust of the class, race or sex of the source, past experience with the source, etc. What concerns us is communicative behavior, i.e., the words or actions of the source on which the receiver bases an attribution. Ekman and Friesen (1969) suggest that the importance of an interaction to a source has a direct effect on his/her ability to control behaviors upon which receivers base truth/deception attributions. They contend that individuals can easily lie successfully about something unimportant. The rationale for this position is clearer when viewing deceptive communication in terms of the source withholding spontaneous behavior and/or engaging in simulative behavior to intentionally create a false belief on the part of the receiver. While one can claim all communicative behavior is spontaneous, some behaviors are not carefully considered by the actor before proceeding (spontaneous) as opposed to those which are additionally monitored in terms of suppressed behavior (simulative). Specifically, simulative behavior in deception involves: 1) the substitution and/or addition of behaviors similar or parallel to those which are suppressed, i.e., those which draw attention of the receiver to the fact that false or irregular information may be being presented; and 2) the self-monitoring by the source of the simulative behavior in terms of his/her spontaneous behavior. This could be consciously suppressing a movement of the foot while trying to capture the receiver's confidence by looking him/her straight in the eye. The conflict and concentration involved when the source attempts to withhold spontaneous behavior which might reveal the "truth" and to substitute simulative behavior does not take place in inconsequential interaction. Unless the interaction is important the source may not go through those processes which differentiate truthful and deceptive communication; the need to hide and simulate behavior stemming from nervous anxiety over detection is absent.

One final factor that limits the scope of deceptive communication is the relational history of an interaction. "Relational history" refers to the interactive experience the receiver has had with the source that enables him/her to perceive behavior on the part of the source in terms of the source's known behavioral idiosyncracies. More precisely, the distinction is being made in terms of the degree to which the history of the relationship allows for the use of psychological data (Miller and Steinberg, 1975) in making attributions concerning the source. This distinction could seemingly place a 50-year marriage, for instance, at one end of the continuum, and an interaction between strangers at the other end of the continuum.

The relational history between interactants can have a marked effect on the process surrounding the truth/deception attribution. Consider interactions between a job interviewer and a series of job applicants: the interviewer has no relational history for the applicants and knows they all want work. The interviewer must determine if the applicant possesses the qualifications claimed during the interview; some form of a truth/deception attribution thus takes place. While talking with the first applicant the interviewer decides that (s)he is lying. However, since the interviewer had no past contact with this applicant, the attribution had to be based on a stereotype of what constitutes deceptive behavior. In this case, let us say that the interviewer based the attribution on two behaviors: the applicant consistently avoided eye-contact and fidgeted throughout the interview.

By contrast, the second applicant is a friend of the interviewer's brother. The interviewer knows nothing about this friend's job qualifications, but has had a chance to interact with him/her in other situations. The interviewer decides the second applicant is honest even though (s)he also consistently avoided eye-contact and fidgeted. In this second case, based on information from their relational history, the interviewer knew the applicant avoided eye-contact and fidgeted whenever asked a lot of questions. The difference in relational history provided information on which different attributions could be based.

In order to avoid an interaction between accuracy and various levels of relational histories among participants, the study presented here deals only with stranger dyads. To deal with relationships of a more interpersonal nature, measures for relational history would have to be developed. Also, any such research would have to develop a typology to equate various levels of relational history based on the type of information interactants used when communicating. The complexity of these tasks, compounded with research considerations yet to be discussed, led to the limitation of this research to pairs of strangers.

Presentation of the Problem

Given the preceding framework for deceptive communication, past research offers a body of inconclusive findings. A number of studies have found nonverbal cues which significantly distinguish deceivers from non-deceivers (English, 1926; Berrien and Huntington, 1943; Ekman and Friesen, 1969a; Matarazzo, *et al.*, 1970; Mehrabian, 1971; Horvath, 1973; Knapp, *et al.*, 1974; McLintock and Hunt, 1975). Even if the weak variety of deception manipulations (an issue to be discussed in the following section) and various procedural problems are ignored, the studies which deal with behavioral correlates of lying do not indicate what behavior receivers examine when making accurate attributions of veracity nor do they address the issue of interaction between a source and a receiver. Differences in the behavior of deceivers and non-deceivers are useful to receivers only if they notice the differences and process them as information useful in making a truth/deception attribution. No research indicates that receivers even notice, let alone base truth/deception attributions upon the behavioral correlates of deception reported in these studies. In fact, accuracy scores from studies examining the ability of untrained observers to detect deception on the part of strangers indicate that if receivers see the behavioral correlates of deception, they do not use them to make accurate truth/deception attributions (Fay and Middleton, 1941; Maier and Thurber, 1968; Ekman and Friesen, 1974; Hocking et al., 1976).

Two studies have examined untrained receivers' ability to detect deception when a maximum range of behavioral correlates of deception are available. Maier and Thurber (1968) found an accuracy score of 58.3% in a live interaction, and Hocking et al. (1976) found an accuracy score of 58.5% when the receiver viewed a videotape of the source. Ekman and Friesen (1974) found a slightly higher accuracy score, 63.5%, by blocking out the head shot and audio track of the videotape viewed, thus limiting the behavioral correlates available for examination. Even using the arbitrarily chosen 50% as a criterion for chance accuracy of receivers detecting deception, neither score (58.5% or 58.3%) seems extremely high. In fact, the highest accuracy score using a visual channel, 63.5%, found by Ekman and Friesen (1974), occurred in an experimental condition where a large number of the sources of behavioral correlates of deception were eliminated. These accuracy scores, in combination with the sender-orientation in behavioral correlate research, limit the utility of their findings. Hocking (1976) observed that "research on visual, paralinguistic, and verbal correlates of lying and truthful behaviors offers little in terms of identifying specific cues on which accurate judgments of deception may be based" (p. 29). One might add that the value of attempts to identify such cues may itself be questionable because, according to Maier and Janzen (1967), judgments of deception seem to be based on impressionistic and intuitive grounds, rather than on the basis of specific behaviors. In fact, it seems unlikely that verbal and nonverbal behavioral cues function independently in signaling or "leaking" clues to deception (Ekman and Friesen, 1969b), but rather in conjunction. If so, what may be indicated is the need for methodology which treats these behaviors holistically, perhaps in terms of amount of information. Such a methodology is also supported by further review of the truth/deception attribution findings.

The greater part of the research dealing with the ability of untrained observers to make accurate truth/deception attributions has found higher accuracy scores in conditions which remove sources of behavioral cues, specifically nonverbal cues. Maier and Thurber (1968) found the highest accuracy score, 77.3%, in a condition where receivers read transcripts of students role-playing deceivers and non-deceivers. Comparatively, Maier and Thurber (1968) reported lower accuracy scores for receivers in the audio-only condition, 77%, which adds paralinguistic cues for examination, and in the live condition, 58.3%, which offers the maximum range of behavioral cues for examination. Hocking et al. (1976) report a similar pattern of higher accuracy the fewer behavioral cues available, with accuracy scores of 62.5% among receivers reading transcripts of deceivers and non-deceivers, 61.8% among receivers hearing audiotapes of deceivers and non-deceivers, and 58.5% among receivers viewing videotapes of deceivers and non-deceivers. Studies by both Ekman and Friesen (1974) and Fay and Middleton (1941) offer no internal information concerning accuracy patterns in relationship to the quantity of available behavioral cues, since they are basically single-channel studies; the former uses just an audiotape and the latter a videotape minus the audio track.

Taken as a whole, the findings of studies dealing with the ability of untrained receivers to make truth/deception attributions concerning strangers indicate that accuracy increases as the transmission channel limits the range of information available for examination. One possible explanation offered by Maier and Thurber (1968) is that visual cues provided by sources serve as distractors rather than helpful aides. This distraction explanation stems from research on the effects of distractive stimuli on persuasion and source credibility ratings. It has been argued that distraction may facilitate persuasion and perceptions of credibility by dividing the attention of a person toward whom a persuasive attempt is directed, reducing the person's ability to scrutinize carefully the oncoming communication, and thus increasing his/her susceptibility to influence (Breitrose, 1966; Dorris, 1967; Osterhouse and Brock, 1970; Keating and Brock, 1974; Brandt, 1976). Given that a deceiver attempts to convince the receiver that his/her deceptive performance typifies normal communicative behavior, persuasive and deceptive settings are analogous. Increasing the amount of available cues places greater demands on receiver attention, perhaps reducing the ability to scrutinize any specific behavior or set of behaviors. If so, then behavioral cues which are extraneous to deception may distract attention from cues which are potential indicators of its occurrence, thus resulting in inaccurate truth/deception attributions.

The conception of the attribution process presented by Jones and Nisbett (1971) and supported by a number of research findings (Jones and Harris, 1967; McArthur, 1970, 1972; Nisbett, Caputo, Legant, and Marechek, 1973; Storms, 1973) also lends theoretical support to the contention that a transmission channel will affect the attribution process, and especially the truth/deception attribution. Jones and Nisbett proposed a theoretical framework for explaining differences in attributions made by sources and receivers, based on divergent perspectives. Attribution theorists contend that sources give considerable weight to external environmental causes when making attributions, while receivers place more emphasis on internal personal causes for the source's behavior. Jones and Nisbett posit that this difference between source and receiver perception can be attributed to the difference in information available to the two participants. In addition to different past experiences and psychological perspectives, the roles of source and receiver force different external perspectives on the two participants. Sources and receivers must look--in a literal sense--hear, and concentrate on different objects and additional interactions in the environment. Through the use of videotape, Storms (1973) found that attributions made by sources and receivers could be reversed by simply providing one with the physical view which the other had of the interaction; the visual perspective significantly changed what participants thought and felt about the interaction. A change in transmission channel of deceptive communication presents receivers with a change in visual perspective. Seeing an event through a camera, reading about it, hearing it, or actually being there alters the amount of information available and the foci of concentration of the receiver.

As noted by Maier and Thurber (1968), traditional positive effects attributed to various transmission channels by many researchers are not supported by the accuracy scores. Wiener and Mehrabian (1968) state, "it is hardly debatable that the greater the quantity and quality of sensory channels available in a communication link, the greater the information potentially put in, through and out of the system" (p. 82). Ryan (1976) expands on Wiener and Mehrabian to include a greater awareness and appreciation of other's (the source's) intentions based on the increase in sensory information provided by face-to-face interaction (McGrath and Altman, 1966; Weston and Kristin, 1973; Champness, 1973; Turnbull, Strickland and Shaver, 1976). In terms of the truth/deception attribution additional sensory information provided by face-to-face interaction does not seem to heighten awareness of the intention of the source on the part of the receiver. This traditional view of channel would suggest a positive effect of increased information due to effective knowledge utilization by the receiver, though truth/deception attribution accuracy findings reject this line of reasoning. The rationale underlying this utilization explanation suggests that, to the extent that the richness of available cues is directly related to increased perceptual acuity on the part of a receiver, (s)he should be better able to detect signals of deceit. This rationale has been offered by researchers involved with the study of teleconferencing (e.g., Ryan, 1976) and is at least implied by Ekman and Friesen (1969a, 1969b, 1974).

An alternative explanation to distraction can more adequately explain the high accuracy score on the part of receivers reading transcripts in comparison to those experiencing the interactions by means of audiotape, videotape, and live contact. Being distracted from verbal testimony by behavioral cues which accurately distinguish between deceivers and non-deceivers should not result in lower accuracy scores on the part of receivers; as noted earlier, such behavioral cues are available which distinguish between deceivers and non-deceivers. Instead of distraction, a form of "information overload" may be leading to the inaccuracy of truth/deception attributions by receivers experiencing interactions through information-abundant channels. Danowski (1974) explains that when individuals receive more information than they can handle--than they have the capacity to process at one time--they experience confusion which results in higher output of error. As visual and paralinguistic cues increase, the amount of data receivers must process also increases (in this case as a function of the transmission channel); with this increase in available information, receivers reach an information-processing threshold, and overload results. Filtering and chunking (Danowski, 1974) are two processing strategies by which receivers can adapt to the overload. Both strategies entail receivers processing information based on stereotypes of deceivers in order to avoid having to process all available data from the source; the inaccuracy of a stereotype leads to the inaccuracy of a truth/deception attribution. The greater the overload as a function of increase in available data from a broad-spectrum sensory channel, the stronger the influence of inaccurate--not highly generalizable--stereotypes on the truth/deception attribution.

Regardless of whether the process which leads to inaccurate truth/deception attributions is distraction and/or overload, the following two hypotheses result:

H_1: As transmission channel(s) increase(s) the amount of nonverbal information available to a receiver, the accuracy of a truth/deception attribution concerning an unfamiliar source will decrease.

H_2: As transmission channel(s) cause(s) an increase in the ratio of nonverbal to total information available to a receiver, the accuracy of the truth/deception attribution concerning an unfamiliar source will decrease.

These two hypotheses offer alternative causal models which would explain the relationship between transmission channel, available information, and the accuracy of a truth/deception attribution (Figure 1 and Figure 2). Nonverbal, total, and the ratio of nonverbal to total available information are hypothesized to be a function of the transmission channel. Transmission channel, for the purposes of this study, encompasses: (1) live, (2) videotape, (3) audiotape, and (4) transcript presentations. In the first model (Figure 1) accuracy of the truth/deception attribution is hypothesized as a function of the amount of nonverbal and total information available, and in the second model (Figure 2) as a function of these two forms of available information in addition

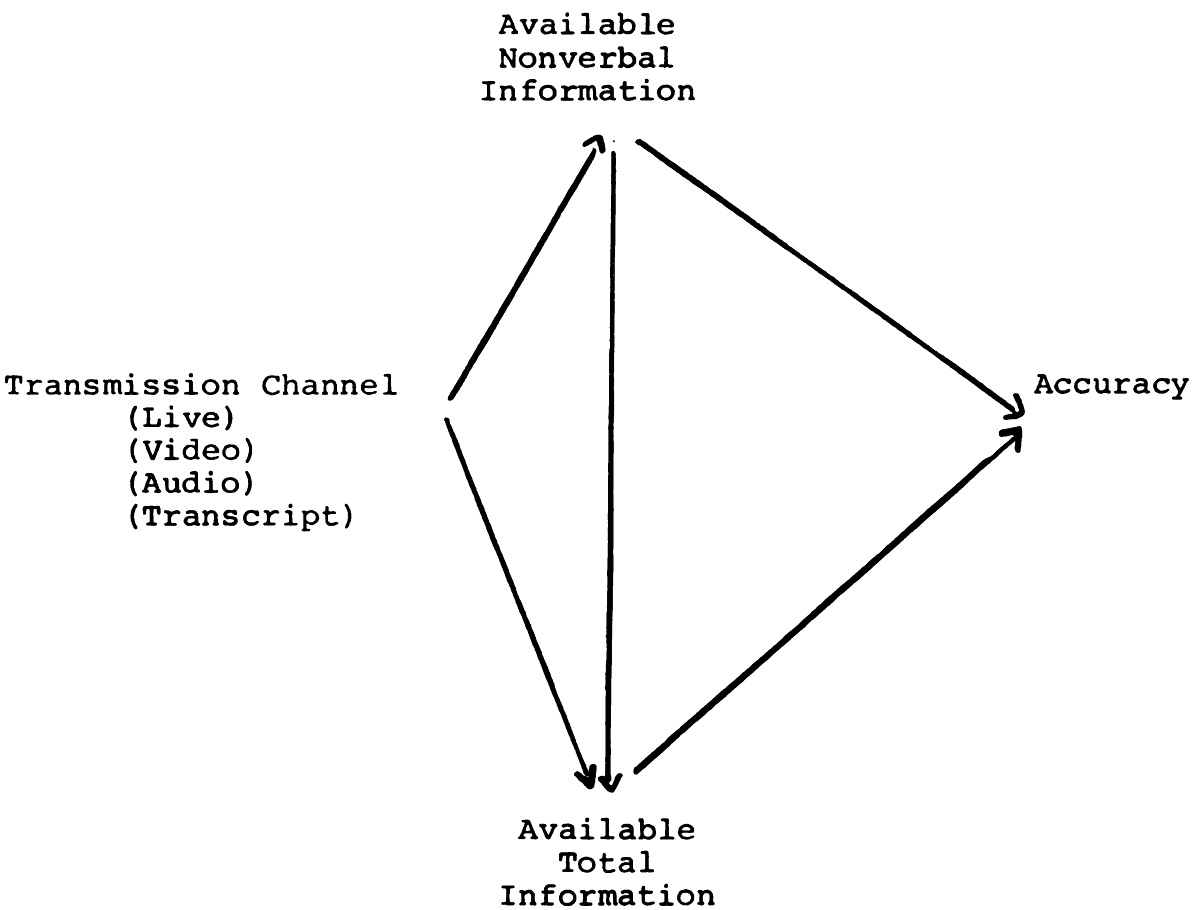


Figure 1. First Model of the Accuracy of the Truth/Deception Attribution as a Function of Available Information and Transmission Channel.

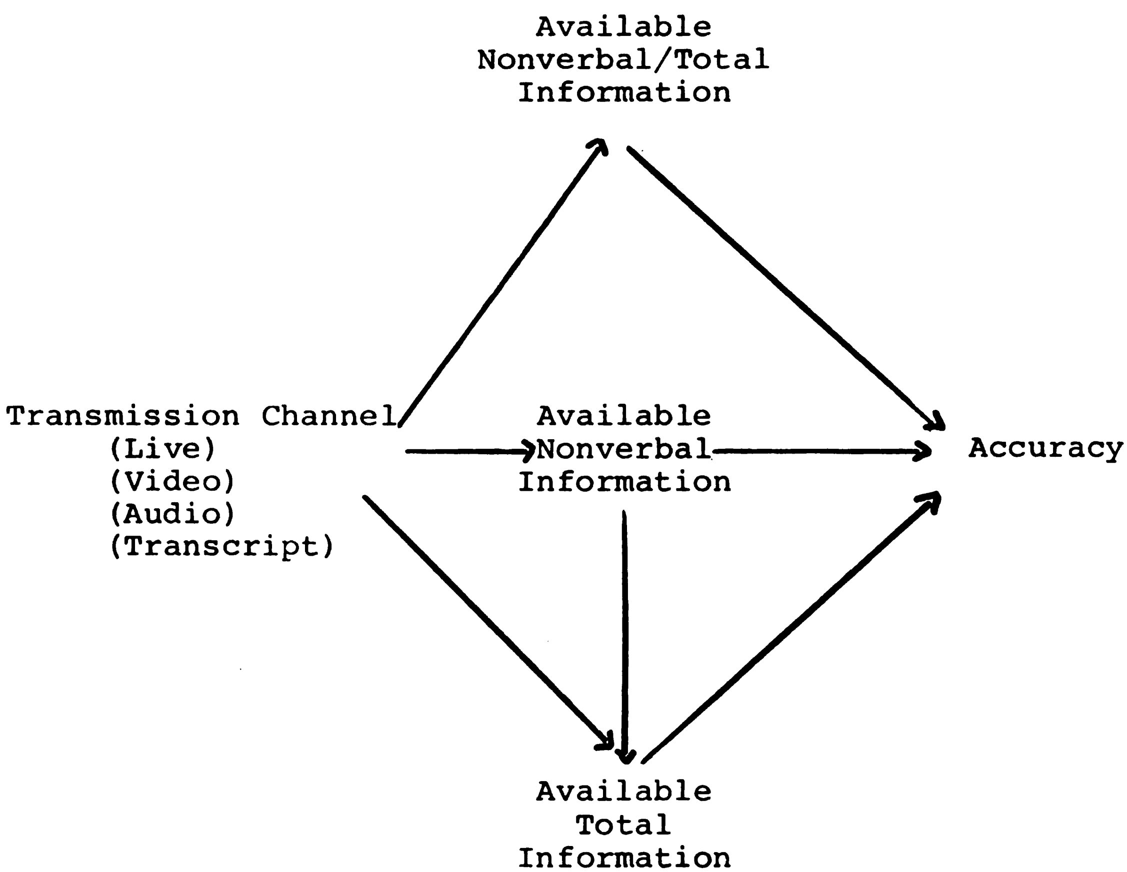


Figure 2. Second Model of the Accuracy of the Truth/Deception Attribution as a Function of Available Information and Transmission Channel.

to the ratio between the two. Verbal information is not included, since it will not vary across the transmission channels and therefore cannot explain the difference in accuracy scores between channels of transmission. Both models also predict that total information will vary as a function of changes in nonverbal information.

In considering these hypotheses, a number of additional comments are appropriate. First, the relationships between amounts of information available and accuracy should hold for changes in amounts of information caused by other factors in addition to transmission channel. However, other factors, such as idiosyncracies of sources as related to the amount of information they provide, may not produce large enough differences in the amount of information available to achieve the effect obtained by moving from a live to a transcript presentation. Also, procedurally, there is little difficulty in making a transcript or a videotape of a live presentation. Getting the same source to provide identical verbal presentations, while carefully and realistically varying amounts of nonverbal information presents a difficult task for all but the adept actor, and using actors in this type of nonverbal study presents serious questions of generalizability. These two considerations lead to the direct concern with channel of transmission as a key factor; this, however, does not imply that the relationship between amount of information and accuracy may not also be mediated by some other factor. In addition, for the present study, a relationship between amount of information and accuracy has been proposed for the truth/deception attribution. Past research indicates that such a relationship is most appropriate to the deception domain; nevertheless, the relationship may hold for other types of attributions. Finally, the hypothesized relationships would hold for interactions where participants have a long relational history only if the mediating process were distraction. If information overload is the process mediating the inaccurate truth/deception attribution, receivers who have interacted with the source over a long period of time would be able to determine what available data were relevant to whether that specific source was lying or telling the truth; as a result of information from the past relationship with the source, overload would not lead to inaccuracy on the part of the receiver.

Procedural Problems with Past Research

All of the studies examining deceptive communication faced the task of creating a stimulus containing samples of deceivers and non-deceivers. A number of problems with the majority of stimuli created call for a careful examination of the previously proposed hypotheses under different conditions.

Creation of a Stimulus

The majority of researchers studying deception told sources to lie or tell the truth in situations that had few and trivial consequences for the liar (see Table 1). Fay and Middleton (1941) told the sources to reply to questions concerning their own physical characteristics according to a card which would be flashed in front of them which read "lie" or "tell the truth." The receivers, who could hear but not see the speakers, had to determine who was lying and who was telling the truth. Methods similar to those used by Fay and Middleton lack saliency for participants, a problem already discussed. "Saliency" refers to the degree to which sources are consciously concerned with the deception, and to the extent to which avoiding detection is important to them. Davis (1961) suggests a "punishment theory" which states the greater consequences of detecting the greater physiological response during lying. In addition, the research of Gustafson and Orne (1963) supports the notion that a person's perception of the consequences of detection of deception affects the likelihood that detection will occur. With minimal consequences for being detected, sources may aid co-participants in this experimental task by purposely behaving as they believe liars behave. The applicability of findings from the studies using a method that has few or trivial consequences connected with detection of deception thus remains questionable.

A second method of generating samples of "liars and truthers" involves having individuals advocate a position consistent with or counter to their attitude (see Table 1). Knapp _et al_. (1974) provide an example of counter-attitudinal

Table 1. Methods Used to Create Lying and Truthful Stimuli Materials in Studies

Counterattitudinal Advocacy	Role Playing
Hildreth (1953)	Maier (1965)
Mehrabian (1971)	Maier and Janzen (1967)
Experiment I	Maier and Thurber (1968)
Experiment II	
Knapp, *et al*. (1974)	
Few or Trivial Consequences	**Serious Consequences**
Marston (1920)	Ekman and Friesen (1969)
English (1920)	Mehrabian (1971)
Goldstein (1923)	Experiment III
Landis and Wiley (1926)	Ekman and Friesen (1974)
Fay and Middleton (1941)	Shulman (1973)
Berrien and Huntington (1943)	Davidson (1968)
Matarazzo, *et al*. (1970)	Hocking, *et al*. (1976)
Cutrow, Parks, Lucas, and Thomas (1972)	
Motley (1974)	
McClintock and Hunter (1975)	
Mehrabian (1971)	
Experiment II	

Mehrabian (1971), Experiment II, employed two methods.

advocacy in their recent study which presents a content analysis of verbal and nonverbal deceptive and non-deceptive behavior. Veterans argued for or against the initial stance they had expressed on the topic, "V.A. Educational Benefits Should Be Increased To Finance The Cost Of An Education Today."

The first problem with the counterattitudinal advocacy method stems from the lack of any theory or data supporting the notion that deceiving is the same as stating the advantages of a position with which one is in disagreement. The advocate may believe the advantages of the opposite view are real, but not strong enough to sway his own opinion. Second, past research indicates that the counterattitudinal process may alter the initial opinion of the advocate (Miller and Burgoon, 1973). If this change in opinion takes place before the end of the speech, a process which thus far has not been tied to any specific point in time, some of the supposed deceivers may really be proadvocating their newly acquired attitudes. A final problem with this method is that when individuals counterattitudinally advocate, they may intentionally generate some cues to let the audience know they are not espousing a position they believe.

The third method of generating samples of "liars and truthers" involves the technique of role-playing lying and telling the truth (see Table 1). Maier and Janzen (1967) asked students to play the role of a student being cross-examined by a professor who suspects him/her of having cheated on an examination. The possibility exists that individuals engaged in this process are merely "acting" as they think deceivers or non-deceivers would act, i.e., attempting to emulate what may be inaccurate personal stereotypes of deceivers and non-deceivers. Since conclusive data on differences in behavior between liars and truth tellers have not been established, no reason exists to believe these stereotypes resemble behaviors resulting from actual deceptive communication.

The final method of generating samples of "liars and truthers" has individuals engaged in ego-involving tasks which provide important consequences for deceivers and non-deceivers. Shulman (1973), Ekman and Friesen (1974), and Hocking _et al_. (1976) use such a procedure (see Table 1) which will be described in detail later in this thesis. Since importance and involvement are two important criteria for examining deceptive communication, the greatest confidence may be placed on the results of studies using methods which arouse them.

Additional Problems

Next to the study by Maier and Thurber (1968), which faced the problem of using role-playing sources, Hocking _et al_. (1976) offer the most convincing findings in terms of the proposed hypotheses. However, a close examination of the Hocking _et al_. design affords an alternative explanation for the findings; i.e., that they were a function of the experimental procedures used in creating the stimulus tapes.

Hocking _et al_. presented a cover story to criminal justice majors designed to create an important task in which they would agree to serve as "liars and truthers." The students received a letter from the director of the School of Criminal Justice asking them to take part in research which would help "identify certain characteristics of individuals which may contribute to their successful performance as police officers" (p. 6). When the students arrived they were told by both the researcher and a dectective, who served as the interviewer to add credibility to the procedure, that the research had been designed to test a possible screening procedure for prospective policemen to be used by police departments. They were told that policemen often face situations where it is useful to provide false impressions and lie; in addition, that the School of Criminal Justice was very interested in the results of this project, particularly how well they as individuals performed the task.

The students were asked to lie about feelings while viewing slides of burn victims and to tell the truth about feelings while viewing slides of beautiful scenery and children playing. Students also lied and told the truth concerning a videotape they saw of a man receiving sentence for a crime. However, the matter was further complicated by telling the students that when lying about the factual information concerning the sentencing, they had to describe what happened in terms of a version of the videotape they had not seen; a description of this version was supplied. This was done to solve the problem of possible varying descriptions by the lying students as opposed to relatively consistent descriptions by students not lying, therefore enabling almost foolproof identification of liars. Each student also gave a sample of truthful communication. The students were videotaped in both color and black and white to check for differences in the format of the visual and audio channels. In addition, a transcript and an audio-only tape of the interaction was made. Finally, in order to control for the possibility that some individuals might always look as though they were lying and others as though they were always telling the truth, two stimulus tapes were made. Tape I was the inverse of Tape II; so, i.e., if person 1 was lying on Tape I, the same person was telling the truth on Tape II. By summing across tapes in order to obtain accuracy scores, the study eliminated the problem of inflating or deflating accuracy scores by choosing a sample of lying behavior from individuals who always looked as though they were lying, or a sample of truthful behavior from individuals who always looked as though they were telling the truth. Under each condition subjects were asked to judge whether the student they observed was lying and to indicate the degree of confidence with which the judgment was made.

The major problem with the Hocking et al. design is that students always told the truth about the pleasant slides and lied about the unpleasant slides. The overload which Hocking et al. posit as a function of transmission channel may have merely been a confusion on the part of the subjects concerning nonverbal cues due to having to view unpleasant slides with nonverbal cues of deception. This confusion was amplified since some students did not really look at the slides while lying, due to the unpleasant content, while others with poorer vision strained to see the slides (which were shown on a screen on the floor in front of them). All these additional nonverbal behaviors, which were a function of the design rather than the transmission channel, would have been missing in the written channel and only partially present in the audio-only channel in the form of paralinguistic cues.

The only attribution that subjects had to explain the additional nonverbal behavior was the truth/deception attribution. The work of Schachter and Singer (1962) offers a theoretical framework for how subjects may have wrongly attributed the behavior. Schachter and Singer conducted an experiment designed to support a two-component theory of emotion. According to the theory, the first component of emotion is physiological arousal. This arousal is identical regardless of the specific emotion; it varies in intensity, not in kind. What differentiates these emotional states phenomenologically is a cognitive or labeling component. Individuals observe the characteristics of a situation and differentially attribute arousal according to their interpretation of their observations of how they think they should be responding emotionally, based on these observations.

Subjects in the Schachter and Singer study were injected with either the drug epinephrine, a synthetic adrenaline, or a placebo (under a doctor's supervision). Those who were injected with the drug would suffer from symptoms of physiological arousal (sweaty palms and increased heart rate, etc.), while recipients of the placebo would not experience these symptoms. A third of the recipients of the drug was accurately informed concerning its effects. A third of the recipients of the drug was told that it produced effects unrelated to arousal. The final third of the epinephrine group was told nothing. The subjects were then put in a waiting room with a confederate, who they believed was a fellow participant in the experiment who had received an injection identical to their own. The confederate then proceeded to exemplify one of two types of behavior: half the time the confederate exemplified euphoric behavior and half the time the confederate exemplified angry behavior. The subjects who received the real drug and accurate information did not indicate any real emotional experience; according to Schachter and Singer these individuals did not have to use the confederate as a source of attribution for arousal, since the experimenter had already provided them with a plausible explanation for the physiological state. The recipients of the drug who were misinformed or not informed as to the effects of the drug indicated emotional experiences similar to those depicted by the confederate; they attributed their physiological state to the social situation to which they were exposed. Subjects receiving the placebo reported little or no emotion due to the lack of the first component, arousal.

The Schachter and Singer findings support the theory that arousal will be attributed in terms of the appropriate explanations provided by the social context in which it is experienced. If these results are extended, arousal, when observed rather than experienced, will be attributed in terms appropriate to the social situation in which it is observed; thus, this allows for an alternative explanation of the attributions made by receivers in the Hocking et al. (1976) study. The unpleasant stimulus which only accompanied lying could have caused cues of arousal due solely to the unpleasant content of the slides. The receivers observing the criminal justice students would explain these cues in terms of the truth/deception attribution, since the situation presented to them was one which called for such an attribution. Since the arousal cue occurred only in those lying (since sources lie only about unpleasant slides), these arousal cues could have inflated the accuracy scores of receivers in all conditions.

Conclusion

Examining the models and hypotheses previously discussed calls for the creation of a stimulus which overcomes as many as possible of the problems noted. This requires dealing with all four transmission channels within the same manipulation procedure. The fact that no previous research has done this makes comparisons of accuracy across transmission channels difficult. The manipulation procedure must be both ego-involving and important to sources, yet not equate role-playing or counterattitudinal advocacy with deception; specifically it must operationalize the details of the definition of deceptive communication presented in this thesis (see p. 4). A deception manipulation procedure used by Exline *et al*. (1970) and Shulman (1973) meets these criteria and therefore is used in this study. Details of the procedure appear in the following chapter.

CHAPTER II

PROCEDURES

Overview

Data gathering involved three stages, each centering around a different group of participants. Stage I involved training coders to reliably estimate the amount of total and nonverbal information available in a given stimulus. Stage II involved taking twelve subject-sources through an experimental procedure which induced half of them to lie when interviewed by the experimenter. Stage III involved subject-receivers and coders seeing, hearing, or reading the interviews of the twelve subject-sources. Subject-receivers filled out questionnaires reporting whether they felt each subject-source was lying or telling the truth, and the coders reported estimates of the amount of total and nonverbal information available, observing each interview in each channel-condition.

In Stage I, eight undergraduates at Michigan State University received eight weeks of training in making ratio-scaled estimates as to the amount of total and nonverbal information available in a given stimulus. Coders were trained in and made estimates by means of a direct interval estimation procedure (Silverman and Johnson, 1975). This procedure called for the experimenter providing coders with two sample segments of interviewing and telling the coders the amount of available total and nonverbal information in these segments. Coders then based all future estimates of amounts of nonverbal and total information on the values assigned to these segments. These two segments were called the "standard interval" throughout the procedure. Segments and values for the standard interval were chosen on the basis of the results from a pretest using the sixteen interview segments in the Hocking *et al*. stimulus.

In Stage II, twelve freshmen at Michigan State University participated in an experimental procedure in which a confederate implicated half the subject-sources in cheating on the experimental task. After the task was completed the experimenter questioned each of the twelve as to what took place during the task. Since none of the twelve reported the cheating, half of them were lying. An experimental pretest was run to ensure standardization of procedures prior to the actual experiment.

In Stage III, undergraduate subject-receivers and coders experienced the interviewing of the subject-sources by watching through a one-way mirror, seeing a videotape, hearing an audiotape, or reading a transcript. Subject-receivers reported whether they thought subject-sources were lying or telling the truth. Coders estimated the amount of available total and nonverbal information as they experienced the interviews.

Sex was controlled for at all times so there were an equal number of male-male, female-female, male-female, and female-male dyads in each channel condition. Past research indicates that sex of either the source or receiver may affect the ability of sources to control and/or receivers to observe nonverbal cues (Fay and Middleton, 1941; Maier, 1965; Mehrabian, 1969, 1971; Shulman, 1973).

The researcher controlled for acquaintanceship since the relationship between the relational history of participants and detection of deception may be subject to confounding effects (see pages 8-9). Thorndike and Hagen (1961) and Woodworth and Schlosberg (1954) found that ideal detectors are those highly familiar with the source's past behavior. Freeberg (1969) agrees, citing Wherry as deriving a theorem that "raters will vary in the accuracy ratings given in direct proportion to the relevancy of their previous contact with the ratee" (p. 10). However, Hastorf, Schneider, and Poleka (1970) suggest the opposite, that a long relational history results in inaccurate detection. Due to these ambiguous results, in addition to the artificial experimental environment in which much of the deception data has been gathered, only strangers to subject-sources served as subject-receivers.

Definitions

The following terminology is used in the design and implementation of the research.

Subject-sources

Subject-sources refers to those subjects who were assigned to complete an experimental pretask with a confederate. After the procedure was completed subject-sources were interviewed by the experimenter as to the details of the procedures used to complete the task.

Subject-receivers

Subject-receivers refers to those subjects who attempted to identify which subject-sources were lying during the interview.

Deception Condition

When the confederate implicated the subject-sources in cheating on the experimental task, if the subject-sources were not willing to admit the cheating to the experimenter, they had to engage in deception during the interview. Therefore any subject-source which the confederate was to implicate in cheating was said to be assigned to the "deception condition."

Nondeception Condition

The confederate did not implicate half the subject-sources in cheating during the experimental task. These individuals engaged in the task as instructed and therefore did not have to lie during the interview. Therefore individuals not implicated in cheating were said to be assigned to the "nondeception condition."

Channel Condition

Subject-receivers and coders experienced the interviews via four different channels: (1) live, (2) videotape, (3) audiotape, and (4) transcript.

Nonverbal Information

Nonverbal information is amount of information available from nonverbal behaviors such as facial expression, eye contact, nodding, hand and body movement, posture, pausing, the ums and ahs people say; anything beyond the actual words an individual uses. Nonverbal information refers to how people say things, not what they say.

Total Information

Total information is a holistic estimate of all available information provided by a stimulus. It is the kind of judgment an individual would make if asked which of two books (s)he had just read provided the most total information. Total information is not necessarily the sum of verbal and nonverbal information. Some nonverbal behaviors may be redundant with some words in terms of the information that each provides. This overlap in information provided by the nonverbal behavior and words would cause total information to be less than the sum of the nonverbal and verbal information.

Coders

Coders are trained individuals who experienced the interview of each subject-source in all channel conditions for the purpose of estimating the amount of available total and non-verbal information.

Experimental Design

Since the present study included a "live" condition, a rather serious procedural problem had to be overcome by employing a Latin square experimental design. The time required for briefing, engaging in the task, the interview, and debriefing of one subject-source was at minimum an hour. Given twelve subject-sources, this would have required subject-receivers and coders in the live channel condition to get through twelve hours of experimental procedures. Because of fatigue and its potential contaminating effect on experimental results, this was deemed impractical. On the other hand, the time actually needed to observe and judge the veracity of one subject-source was approximately ten to fifteen minutes. Thus, in the videotape, audiotape, and transcript conditions, subject-receivers would only have to spend ten to fifteen minutes per subject-source. To minimize the time required of each subject-receiver and still ensure that all twelve subject-sources were judged, subject-receivers were counterbalanced across conditions and subject-sources using a simple Latin square design (Lindquist, 1953; see Figure 3).

Lindquist (1953) explains that simple Latin square designs are used often when experimental administration becomes unmanageable or impractical. In addition to the twelve hour

Subject-Source

Subject-receiver Sample	1 2 3	4 5 6	7 8 9	10 11 12
A	LIVE	VIDEO	AUDIO	TRANSCRIPT
B	TRANSCRIPT	LIVE	VIDEO	AUDIO
C	AUDIO	TRANSCRIPT	LIVE	VIDEO
D	VIDEO	AUDIO	TRANSCRIPT	LIVE

A = 20 subject-receivers (5 randomly assigned to each cell)

B = 20 subject-receivers (5 randomly assigned to each cell)

C = 20 subject-receivers (5 randomly assigned to each cell)

D = 20 subject receivers (5 randomly assigned to each cell)

One half of the subject-sources were randomly assigned to the deception condition.

Figure 3. Counterbalancing of Observers in Latin Square Design

problem discussed in the previous paragraph, the design of the room from which one-way mirror observation took place prohibited using more than six subject-receivers and three coders at one time without blocking someone's vision. Also, the one-way room was not soundproof; any noises made by subject-receivers and/or coders would have cued subject-sources to the deception-inducing procedure. In order to keep subject-sources unaware of the confederate's true identity and the fact that they had been manipulated into lying, it was necessary to keep the observation group small, and the observation time short. By using a Latin square design only five subject-receivers and three coders observed any subject-source at one time.

In the design used, 20 subject-receivers observed three different subject-sources in each condition channel, yielding 240 judgments for use in analysis. Four independent random samples of subject-receivers, A-D, were counterbalanced across the four channel conditions and groups of three subject-sources (see Figure 3). Five members from each sample watched three subject-sources in each channel condition. So, in the live condition, subject-sources 1-3 were observed by subject-receivers 1-5 of sample A, subject-sources 4-6 by subject-receivers 1-5 of sample B, subject-sources 7-9 by subject-receivers 1-5 of sample C, and subject-sources 10-12 by subject-receivers 1-5 of sample D. In the videotape condition, subject-sources 1-3 were observed by subject-receivers 6-10 of sample D, subject-sources 4-6 by subject-receivers

6-10 of sample A, subject-sources 7-9 by subject-receivers 6-10 of sample B, etc. Thus, "the comparison of overall treatment means for any one classification would then appear to be completely balanced so far as the effects of superimposed treatments from other classifications are concerned" (Linquist, 1953, p. 258). Parallel groups of three coders were assigned to each of the four samples and counterbalanced in the same fashion. This procedure enabled three subject-sources to participate in the experimental procedure on four separate nights. Five subject-sources and three coders observed each night; each night the observers were from the assigned sample.

Experimental control called for two additional adjustments in sampling for this design. First, conducting the experimental procedure over a period of four nights increased the possibility of interactions between subject-sources that would cue future subject-sources concerning the manipulations and observations. In order to limit the possibility of such a problem, all subject-sources were freshmen obtained from different introductory communication classes; the goal was that no subject-source from any one evening would be familiar with a subject-source going through the procedure on any other evening. Debriefing of subject-sources confirmed that those from any one evening were not familiar with those who went through the experimental procedure on other evenings. Second, sampling had to allow for control of sex on all factors. Six females and six males, freshmen volunteers from introductory communication classes, were randomly assigned to the deception and non-deception conditions so that three females and three males were in each condition. Ten males and ten females, volunteers from each of four different introductory communication classes, served as subject-receivers; each class served as one sample (A-D) in the Latin square design. Assignment to each condition was done so that there were an equal number of male-male, male-female, female-female, and female-male subject-source and subject-receiver dyads within each condition and in terms of each A-D sample. This produced the design represented in Figure 3 with sex controlled for along all factors.

Coder Training

Four male and four female undergraduates were trained over an eight-week period in providing holistic estimates of nonverbal and total information available in a given stimulus. Reliabilities for coder estimates were computed for nonverbal information, total information, the ratio of nonverbal to total information, and the log transformation data estimates of nonverbal and total information using Cronbach's alphas (Cronbach, 1951). The coefficients for reliability are .98, .96, .99, .99 and .98 respectively ($p<.05$). Log transformation reliabilities are reported since some of the analyses were done on transformed data (see Appendix A).

All information measures were made by coders trained by means of ratio-scaled direct interval estimation. In direct interval estimation coders are shown two stimuli possessing different amounts of the attribute being estimated; in the present study nonverbal and total information are the attributes. Each stimulus is assigned a number of points for each attribute, which represents the amount of that attribute the stimulus contains in terms of the other stimulus. For example, if the first stimulus had half as much nonverbal and total information as the second, the first stimulus would be assigned half as many units of nonverbal and total information as the second stimulus. The stimuli could be assigned any number of information units as long as the units represented the actual ratio of information between the two. These two stimuli, together with the assigned attribute values, serve as the standard interval, the "psychological ruler" in terms of which all further estimates are based (Silverman and Johnson, 1975).

The first problem researchers faced in using direct interval estimation centered around choosing two stimuli and values for nonverbal and total information which would allow for accurate and reliable estimates by coders, and would validly operationalize the constructs as defined by the experimenter. For this purpose, a pretest was conducted using the sixteen segments of interviews in the edited Hocking _et al._ (1976) stimulus. Twenty undergraduates from an introductory communication course at Michigan State University were shown videotapes of sixteen students being interviewed. After each segment the students wrote down how much nonverbal and how much total information they felt were available in that segment. Nonverbal and total information were defined for all students. In addition, they were told that a blank screen represented 0 units of all types of information and the first interview represented 100 units of nonverbal information and 150 units of total information (see Appendix B, Pretest Instructions and Questionnaire). The mean for nonverbal information and total information was calculated for each of the 16 segments of the Hocking et al. (1976) stimulus. Based on these means two segments were chosen for the standard interval such that Segment 1 was estimated in the pretest to have half the amount of total information and half the amount of nonverbal information as Segment 2. Segment 1 was assigned the values of 100 units of nonverbal information and 150 units of total information. Segment 2 was assigned the values of 200 units of nonverbal information and 300 units of total information. These two segments served as the standard interval throughout coder training and the actual experiment.

Each coder attended a minimum of two 2 1/2 hour training sessions each week for eight weeks; sessions always involved at least three coders. Coders were shown the standard interval throughout the session and asked to estimate the amount of nonverbal and total information available in a number of different stimuli. The training stimuli included the remaining 14 from the Hocking *et al.* (1976) videotapes, audiotapes from another stimulus used by Hocking *et al.* (1976), short interviews done live with Michigan State University faculty and graduate students, transcripts from various other studies, and videotape segments of simulated courtroom testimony developed for other studies funded by a National Science Foundation grant. To avoid the fatigue which usually accompanies long time periods of estimating nonverbal behaviors (Harrison and Knapp, 1972), coders received a fifteen-minute break every forty-five minutes. At the end of the eight weeks coders participated in a pretest of experimental procedures, estimating the amount of nonverbal and total information through the one-way mirror. After the experimental procedure was standardized the actual experiment began, with coders taking estimates for all subject-sources in all channel conditions (see Appendix C, Questionnaire Used by Coders to Make Information Estimates).

Experimental Procedure

The experimental procedure used on subject-sources was almost identical to that used by Exline *et al.* (1970) and Shulman (1973). Twelve volunteers were asked to participate in a study to examine group problem-solving strategies. They were all told that they would be working with other students who had volunteered and that all students participating would receive extra credit in an introductory communication course.

Subject-source introduction. When each subject-source arrived in a designated waiting room, (s)he found another student, a female confederate, waiting. The confederate was always the same female, since Shulman (1973) found that confederate sex had no significant effect in terms of this procedure; however, changing confederates has been shown to have confounding effects on experimental results (Rosenthal, 1967; Rosenthal, 1968; Barber and Silver, 1968). Soon after the arrival of the subject-source the two students were escorted into a corridor of small rooms across the hall. The experimenter explained that they would be asked to solve a problem and afterward answer some questions. She continued:

> We have had some problems lately with individuals misunderstanding questions on the questionnaires, answering them wrong, and then leaving. After they are gone, we have a hard time getting people to come back and remember what happened during the problem-solving. As a result I would like to interview you afterwards and videotape the interview. Is it all right with you?

Both the subject-source and confederate agreed. They were then shown the room where the interview would take place and told that a videotape camera was recording them through the one-way mirror. The dyad was then taken into another room in the corridor in order to engage in the task (see Figure 4 for Layout of Laboratory Facilities).

The two students were seated at a table next to the experimenter and given two pieces of scrap paper. The

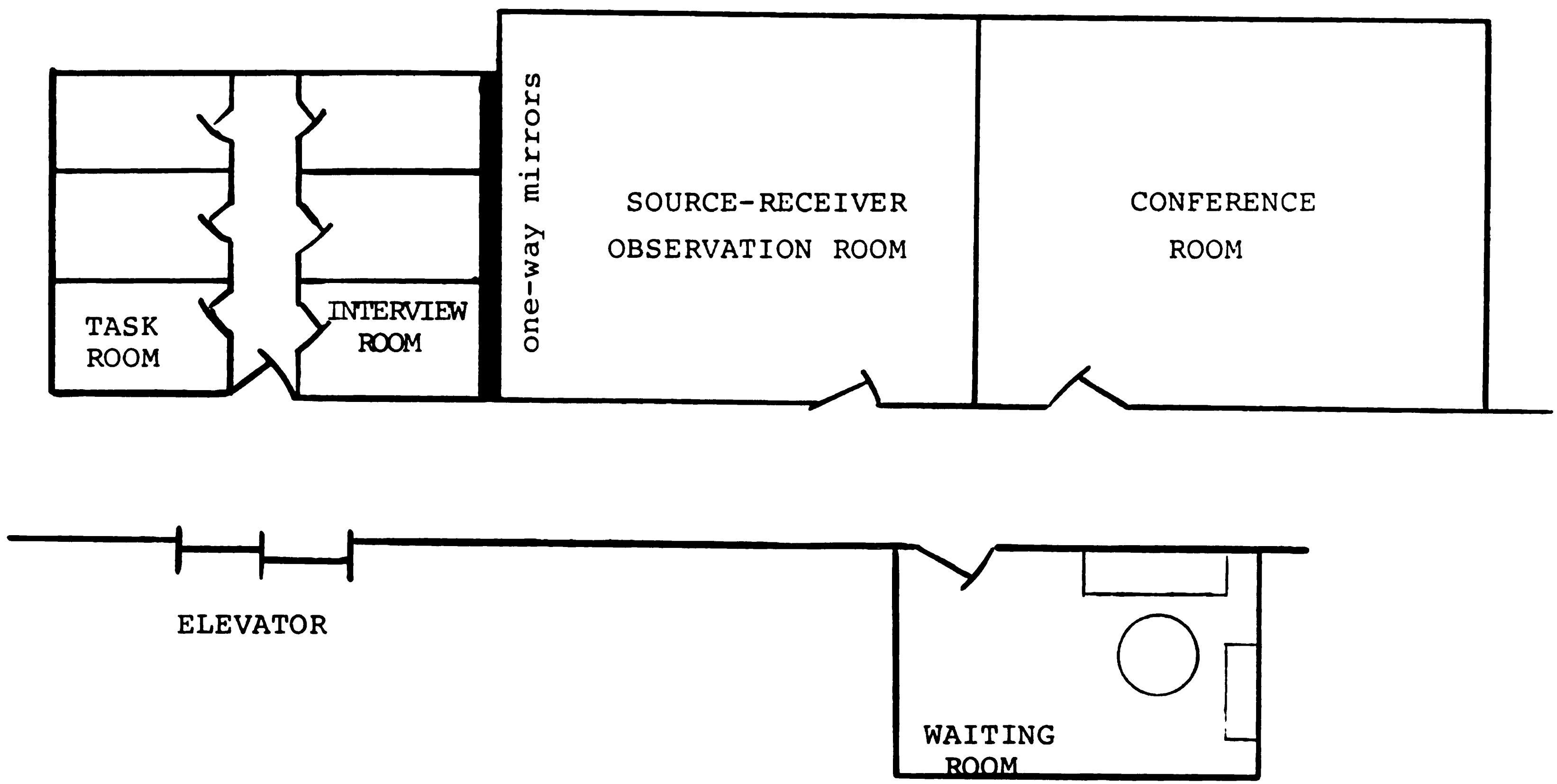


Figure 4. Layout for Laboratory Facilities

experimenter and given two pieces of scrap paper. The experimenter explained that they were participating in a grant funded by the National Science Foundation and designed to examine the relationship between group size, group problem-solving strategies, group success, and the sex combinations of group members. The experimenter added that four-, three-, and two-person groups, as well as individuals, were being asked to engage in identical content-free tasks. She said afterwards that the group members would be interviewed concerning the problem-solving strategies used in completing the task. They were told that the government was very interested in using the results of these experiments for guidance in the formation of various task forces throughout the bureaucracy, and as a result had provided funds for the research. Since the task they would be asked to complete was rather boring, in order to sustain interest in it, the group in each size category which performed the best would receive $50 to divide among its members. All subject-sources were informed that they had randomly been assigned to a dyad group and matched with a student from another class (see Appendix D, Introduction to Subject-sources).

Decision task. The task required the dyad agree upon the number of dots in figures on nine 8 1/2 x 11-inch cards. The experimenter would show each of the cards to the dyad for fifteen seconds. They then would have to agree on one number which they felt represented the correct number of dots for that card. They were told they were to function as a team, take as much time as needed, use whatever strategy they wish, and use the pieces of paper they had been given to take down whatever notes they needed or to do calculations.

Before exposing the cards, the experimenter stated that she would try to provide the dyad with feedback as to their accuracy after each set of three cards. At this point the confederate always asked if she could "talk to my partner and is there any trick or pattern in the answers that we are supposed to figure out." The experimenter emphasized that the two students should discuss what was going on whenever they felt it necessary and that as far as she knew there was no pattern or trick involved in the task.

The experimenter then proceeded to show the dyad a practice card, let them deliberate, record their answer, and give them the correct answer. After the practice card was completed and any further questions answered the actual task began. During the early trials the experimenter manifested some impatience with the length of time the dyad took to complete the task. Though nothing was said concerning the amount of time, the experimenter looked at her watch, squirmed during the discussion, and carried out her role in a hurried manner. This was done so that after the third card, when the confederate asked for some feedback as to how the dyad was doing, the experimenter could logically respond, "It's not really important now and this is taking a lot longer than usual. Let's go on through a couple more cards and then I'll give you the answers for half; that way we won't keep the next group waiting too long (see Appendix E, Sample Task Card).

Implication procedure. The subject-sources randomly assigned to the deception condition were implicated in cheating to create a strong motive to conceal information during the post-task interview. The procedure began when somewhere between the fourth and sixth card a second experimenter, who had been listening to the interaction from an observation room, interrupted the experimental session to inform the first experimenter that she had an "important telephone call from the director of the research project." The first experimenter then left the room to take the alleged call. Actually, she went into the waiting room until the implication procedure was completed.

If the subject-source was in the nondeception condition the confederate just engaged in normal conversation with him/her during the experimenter's absence. However, if the subject-source was in the deception condition the confederate went through a procedure to implciate him/her in the act of cheating.

The confederate opened the cheating phase by getting up to walk around in order to stretch her legs. On returning to her seat, the confederate noticed the experimenter's folder which she had left on the floor beneath her chair. The confederate wondered aloud if the folder might contain the right answers, and complained that the experimenter had rushed them and had not provided the promised feedback. "She was supposed to give us the answers. How are we supposed to know how close we are, how we are doing?"

Next, the confederate suggested that they look and see what was in the folder, and mentioned that she "really could use that prize money." Toward the end of the speech the confederate went over to the experimenter's chair and picked up the folder, which contained the answer keys typed on 5" x 8" cards. Each of the answer key cards had the task number on it, followed by the number of dots for that card. The confederate continued, "I think these are the right ones. I'll copy these down--we can look at them as we go along." Regardless of the subject-source's reaction, the confederate wrote down the information on the piece of scrap paper which the dyad had used to make notes and estimates for previous cards. The confederate always read the information aloud as she wrote, assuring that the subject-source heard the answers. She also always used the notes she got from cheating to make the remainder of the estimates. The confederate then replaced the answer keys and folder just before the experimenter returned to the room.

Whether or not the subject-source had helped the confederate list the answers (s)he knew that the confederate had cheated. At minimum, the subject-source had been implicated as an accessory. Four courses of action were thus open to the subject-source: (1) (s)he could have prevented implication by not allowing the confederate to cheat; (2) (s)he could have undone the implication by reporting the cheating to the experimenter upon her return; (3) (s)he could have sat quietly, inactively accepting the implication of cheating; or (4) (s)he could have helped the confederate. All subject-sources chose either (3) or (4) as their course of action.

It was important that the experimenter not know if the subject-sources were assigned to the deception or nondeception condition, so she would not differentially question subject-sources based on her knowledge that they had been cheating. It was also important that the experimenter not return before the confederate had completed the implciation procedure and thus catch the dyad in the act of cheating. Therefore, a means had to be developed for monitoring the whole implication procedure. A second experimenter listened from the observation room to the conversation of the confederate and the subject-source. After the confederate had implicated the subject-source in the act of cheating, the second experimenter told the first experimenter she could return from the "alleged" phone call. However, in order that the first experimenter could not tell who was in the deception condition due to a longer period of time before she was allowed to return, the duration of the experimenter's absence was held constant across conditions. The timing also served to protect the confederate's cover in that the subject-source had little time to question the confederate before the first experimenter returned.

Upon the return of the experimenter the final task cards were completed. As the dyad discussed each card, the confederate attempted to get the subject-source to agree to report almost the exact number of dots listed on the answer key. If the subject-source resisted, the confederate was instructed to push as hard as seemed feasible, and then to hold out for an answer close to the one originally proposed.

Interviewing procedure. After the task was completed, the experimenter took the dyad into another room to interview them concerning the strategies used to arrive at answers to the task. The experimenter always began by interviewing the subject-source first under the pretense that the confederate would next be asked the same questions. The questions were as follows:

1. Please state your name.
2. Year in school?
3. What are you majoring in?
4. Have you ever been in any research before?
5. How many communication courses have you had?
6. Could you describe the strategy your group used to get their answers?
7. Could you be a little more specific? You did really well, especially toward the end.
8. If you had to describe to the next group what they should do to do as well as you did, what would you tell them, in two short sentences?
9. If you could choose what size group you could do the task over again in, what size would you

choose, 4, 3, 2, or alone?

10. Why?
11. Is there anything else you could add about the strategy you used?

The first five questions provided subject-receivers with a sample of the subject-source's truthful behavior, as well as providing demographic information for future examination. If the subject-source were in the implication procedure, the remainder of his/her answers was untruthful, since no subject-source had mentioned that either (s)he or the confederate had cheated.

Debriefing. Due to the deceptive nature of the implication procedure, a one-to-one debriefing was conducted with each subject-source. After the interview was complete the dyad was taken into another room in the corridor. The first experimenter left and the second experimenter came in to debrief the subject-source. After the identity of the confederate had been revealed, she left and went to the waiting room to begin the procedure again. The debriefing included a long explanation of the research grant funding the study, the true purpose of the study, a review of the literature which led up to the procedural choices made, an explanation of the actual procedure, and the answering of any further questions. All subject-sources were told that no subject-source in the deception condition had revealed the cheating to the experimenter. They were further assured by the fact that this was also true in the Exline *et al.* (1970) and

Shulman (1973) studies. Subject-sources were offered a chance to see themselves on videotape, asked if it were still all right to use the videotape, and asked if they would like to receive the results of the study. No one objected to the use of the videotape; however, most subject-sources did not want to see it. Most subject-sources were enthused about the study, thought the procedure was clever, and wished to receive results. The debriefing usually took fifteen to twenty minutes. Debriefing continued until the experimenter was sure the subject-source understood the experimental procedures, and understood the reason for the study and the procedures. The experimenter also questioned the subject-source as to whether (s)he had suspected his/her partner was a confederate.

Data Gathering

Subject-receivers. Eighty students from introductory communication courses served as subject-receivers in the present study. Each student received extra credit for his/her participation. Twenty students were taken from four different classes; ten from each class were females and ten were males. Five students from each class were assigned to observe three of the subject-sources in each channel condition (refer to experimental design section for details).

Each subject filled out a questionnaire telling whether they felt the subject-source was lying or telling the truth. Prior to observing the subject-source the experimental procedure was explained to them in detail (see Appendix E, Subject-receiver Instructions and Questionnaires).

Live condition. The live condition called for somewhat unique data gathering procedures, since the subject-receivers had to remain in the experimental area unobserved while the subject-sources were taken through the experimental procedure. A conference room next to the room from which one-way mirror observation took place housed the subject-receivers for the three hours of experimental procedures (see Figure 4).

Upon their arrival, the experimenter explained the procedure to subject-receivers, and stressed the importance that no subject-source ever be aware of the subject-receivers. For this reason subject-receivers were asked to remain in the conference room with an experimental assistant until right before each interview.

When the final phase of the task began, the assistant took the subject-receivers into the one-way mirror observation room. From there they observed the five minutes of interviewing. Since the one-way mirror was not sound-proof, it was emphasized that there must be total silence during the observation. Questionnaires were left in the conference room and filled out when subject-receivers returned after each subject-source. No discussion took place among the subject-receivers concerning their judgments. The assistant experimenter monitored subject-receivers throughout the entire three hours and a television, cards, and other recreational materials were provided to divert the subject-receivers' attention away from the judgments while they were waiting. No subject-receiver was allowed to travel from room to room in the experimental area until the assistant had checked that the halls were free of any subject-sources.

Other channel conditions. For the videotape, audiotape, and transcript conditions no such complex procedure was necessary. Subject-receivers were shown the stimulus in a room, and after exposure to each subject-source filled out the questionnaire. They were monitored during this period to make sure all judgments were made independently. All stimuli were shown once. The subject-receivers had no time limit as to how long they could take to make a judgment.

In the audiotape condition all subject-receivers listened to the stimulus with their eyes closed in order to cut down on environmental distraction. In the transcript condition (see Appendix G, Transcripts) subject-receivers were only allowed to go through the transcript once; however, as in other conditions, they could take as long as they wished.

Potential Procedural Problems

Accuracy probabilities. In this study, as in other studies examining ability to detect deception, half the subject-receivers did not lie. Also, as in other studies, the 50% accuracy criterion was used for evaluating chance accuracy. This criteria has been criticized since individuals do not normally expect sources to be lying 50% of the time, and in other studies (Hocking et al., 1976) receivers were told that the probability might be 100% or 0; in such cases 50% may not be a realistic criterion. However, in this experiment each subject-receiver saw three subject-sources; these subject-sources were assigned to deception and nondeception conditions randomly. Therefore, some subject-receivers saw three deceivers, some saw three nondeceivers, and some saw a combination of the two. Subject-receivers were informed as to this variable probability of seeing deceivers and nondeceivers. The 50% criterion applies here since each subject-receiver had two choices which they understood were equally likely.

Independence of judgments. The judgment procedure assumes the independence of the three judgments of each individual. All subject-receivers were told of the random assignment of subject-sources to conditions and the necessity of independence of judgment was emphasized. The range of combinations of responses of subject-receivers in the data did not indicate judgments were dependent, and since analysis was basically done between channel conditions, random assignment to channel conditions should make any problem with dependency of judgments equally likely in all channel conditions, and thus have no major effect on results.

Likewise, running subjects together could be said to bias the independence of judgments. Again, in this experiment all precautions were taken to ensure independence of judgments.

CHAPTER III

RESULTS

Introduction

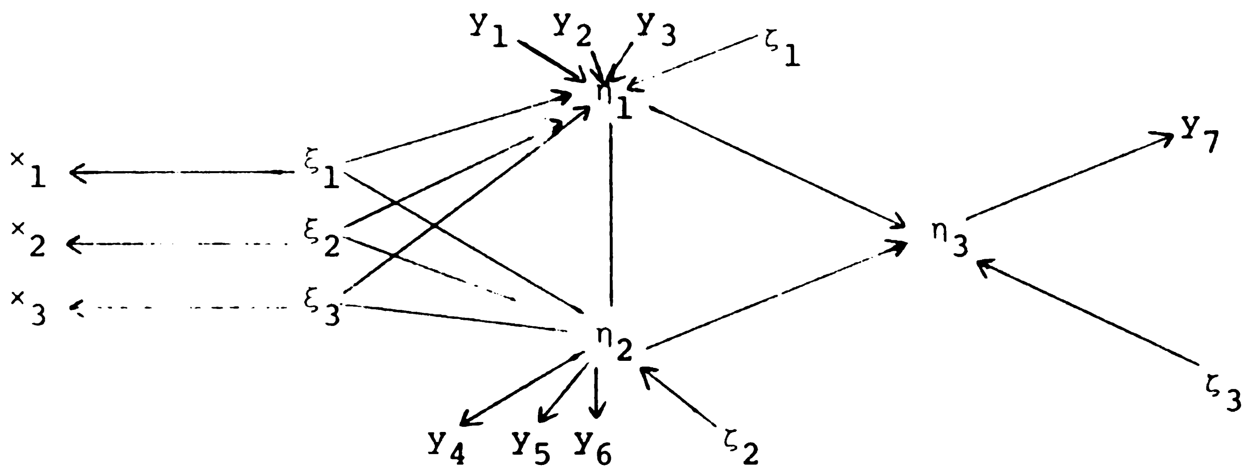
Before discussing the results of this study, a few statements concerning data handling and the analytical tools are necessary. In the two suggested models (see Figure 1 and Figure 2) judgment accuracy is the dependent variable, available nonverbal information, available total information, and the ratio of available nonverbal to available total information are the intermediate endogenous variables, and various channel conditions are the exogenous variables. In testing these models four data handling procedures need explanation: 1) conditions are dummy-coded throughout all the analyses; 2) some analyses are performed on logarithmically transformed data; 3) based on the requirements of the analytic method, coders are handled as multiple-indicators of an underlying variable or collapsed to the mean which functions as a single-indicator; and 4) usage of a dichotomous dependent variable.

Three options were available concerning the four channel conditions: 1) channel condition could be the single true exogenous variable with each channel condition coded as a different level of the variable (0 = transcript, 1 = audiotape, 2 = videotape, 3 = live); 2) channel condition could be the single exogenous true variable, with the condition channels functioning as multiple indicators; and 3) each channel condition could be a true exogenous variable with all judgments falling within the respective condition coded as 1, and all excluded coded as 0. The third option offers the benefit of discovering any pattern between the independent channels and the endogenous variables, as well as handling the linear hypotheses suggested; for this reason channel conditions are dummy-coded. Dummy-coding the exogenous variables explains why only three conditions appear in Figure 5 and Figure 6. By coding three channels 0 or 1, the fourth, transcript, becomes embedded in the coding scheme. More precisely, if

$$Y = b_0U + b_1X_1 + b_2X_2 + b_3X_3 + E,$$

Y = one of the intermediary endogenous variables in the models
X_1 = Live
X_2 = Videotape
X_3 = Audiotape
U = Transcript

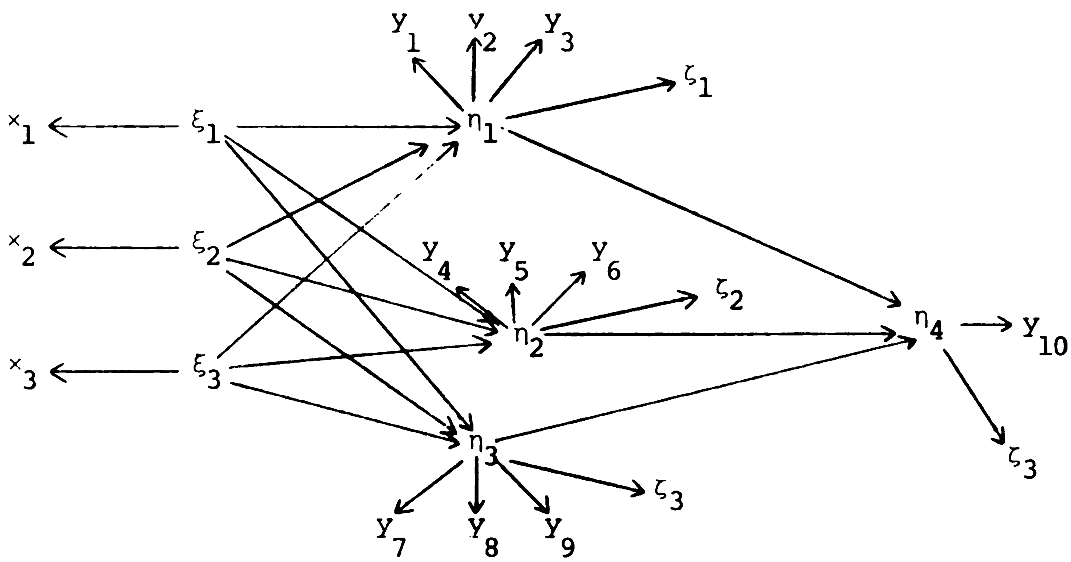
"we show that unique estimates are possible for the b_i's if a side condition $b_0 = 0$ is imposed. . . Consequently, the inclusion or exclusion of the unit vector causes no change in expected values or error terms. Nor will the degrees of freedom be modified as b_0 is not counted in the model, for it is not an independent (of the other b_i's) unknown weight" (Namboodiri, Carter and Blalock, 1975, pp. 138-139).



Where:

ξ_1 = Communication Channel (True Variable)
ξ_2 = Communication Channel (True Variable)
ξ_3 = Communication Channel (True Variable)
η_1 = Available Nonverbal Information (True Variable)
η_2 = Available Total Information (True Variable)
η_3 = Ability to Attribute Truth or Deception (True Variable)
ζ_1 = Distrubance Term for η_1
ζ_2 = Disturbance Term for η_2
ζ_3 = Disturbance Term for η_3
x_1 = Live Condition (Indicator of ξ_1)
x_2 = Videotape Condition (Indicator of ξ_2)
x_3 = Audiotape Condition (Indicator of ξ_3)
y_1 = First Coder's Estimate of η_3
y_2 = Second Coder's Estimate of η_3
y_3 = Third Coder's Estimate of η_3
y_4 = First Coder's Estimate of η_2
y_5 = Second Coder's Estimate of η_2
y_6 = Third Coder's Estimate of η_2
y_7 = Observer Judgmental Accuracy

Figure 5. Model of the Relation Between Accuracy, Available Nonverbal Information, Available Total Information, and Channel



Where:

ξ_1 = Communication Channel (True Variable)
ξ_2 = Communication Channel (True Variable)
ξ_3 = Communication Channel (True Variable)
η_1 = Available Nonverbal Information (True Variable)
η_2 = Available Total Information (True Variable)
η_3 = Available Nonverbal/Available Total Information (True Variable)
η_4 = Ability to Attribute Truth or Deception (True Variable)
ζ_1 = Disturbance Term for η_1
ζ_2 = Disturbance Term for η_2
ζ_3 = Disturbance Term for η_3
ζ_4 = Disturbance Term for η_4
x_1 = Live Condition (Indicator of ξ_1)
x_2 = Videotape Condition (Indicator of ξ_2)
x_3 = Audiotape Condition (Indicator of ξ_3)
y_1 = First Coder's Estimate of η_1
y_2 = Second Coder's Estimate of η_1
y_3 = Third Coder's Estimate of η_1
y_4 = First Coder's Estimate of η_2
y_5 = Second Coder's Estimate of η_2
y_6 = Third Estimate of η_2
y_7 = First Estimate of η_3
y_8 = Second Estimate of η_3
y_9 = Third Estimate of η_3
y_{10} = Subject-receiver Judgmental Accuracy

Figure 6. Model of the Relation Between Accuracy, Available Nonverbal Information, Available Total Information, the Ratio Between Available Nonverbal and Available Total Information, and Channel

For some analyses the data are logarithmically transformed as a means of dealing with multicollinearity in the model. Analyses assume that underlying relationships among variables are linear and additive, and the effects of variations in available information via communication channel were not expected to be necessarily additive. Logarithimic transformation seemed appropriate because it makes non-linear, non-additive relationships linear and additive (Namboodiri, Carter and Blalock, 1975, p. 489). The remainder of the effect of multicollinear variables is accounted for by the path from nonverbal to tal information. The transformation formula used is: transformed variable = (variable + .05) $\log_{10}$. Because most of the analyses involved these transformed variables, results from all procedures are reported for both transformed and non-transformed variables; the reader may observe that the transformations in no way distorted the relationships among variables, no had significant effects on initial reliability coefficients.

The high inter-coder reliability (see Appendix A) for the informational variables allowed for analysis using the mean of the estimates from the three coders as a single indicator of informational variables without distorting the data. For three reasons available information estimates were originally gathered to be used as multiple indicators of the underlying true variables: 1) the measurement procedure and conceptualization of these informational variables is new;

without previous work for comparison, multiple-estimates were necessary to establish reliability and allow for their use if reliability was too low for single estimation or averaging; 2) the proposed models are tested using the LISREL program (Jöreskog and Van Thillo, 1972) and optimal use of the analytic capabilities of this program calls for multiple indicators of unmeasured variables; and 3) multiple indicators allow for overidentification of the models, thus providing "some (of the) excess information (which) may then be used to test the adequacy of the model, since not all sets of empirical data will satisfy the model" (Namboodiri, Carter and Blalock, 1975, p. 448-450, 496-505; also see Stein, 1976). The LISREL analysis is reported in this chapter; however problems encountered with the procedure made it necessary that a two-stage least square analysis (2SLS) (Namboodiri, Carter and Blalock, 1975) be performed to clarify findings. The 2SLS, in addition to the analysis of variance of judgmental accuracy by experimental condition (ANOVA), and *a posteriori* comparison of cell means utilizing the Newman-Keuls procedure, are more appropriately handled using the mean estimates of the three coders as the informational variables. High intercoder reliability (see Appendix A) allows for these procedures with little need to correct for attenuation. Therefore, a comparison of averaged and multiple-indicator handling of descriptive statistics is presented for coder estimates and averaged data (Tables 2, 3, 4 and 5), along with the LISREL

Table 2. Descriptive Statistics for Non-transformed Variables

Variable	Mean	Standard Deviation	Range	Minimum	Maximum
Nonverbal Information (mean from 3 coders)	164.646	111.670	383.333	0.000	383.333
Coder 1	172.083	120.092	395.000	0.000	395.000
Coder 2	165.875	122.386	425.000	0.000	425.000
Coder 3	155.979	107.244	340.000	0.000	340.000
Total Information (mean from 3 coders)	281.146	105.390	403.667	114.000	517.667
Coder 1	290.313	108.337	364.000	122.000	486.000
Coder 2	285.833	116.698	485.000	110.000	595.000
Coder 3	267.292	102.182	400.000	80.000	480.000
Ratio of Nonverbal/Total Information* (mean for 3 coders)	.493	.230	.818	0.000	.818
Coder 1	.493	.296	.813	0.000	.813
Coder 2	.490	.295	.892	0.000	.892
Coder 3	.494	.294	.769	0.000	.769
N=240					

*Note that the possible range of a ratio is truncated to between 0 - 1.

Table 3. Descriptive Statistics for Transformed Variables*

Variable	Mean	Standard Deviation	Range	Minimum	Maximum
Log Transformation of Nonverbal Information (mean from 3 coders)	1.410	1.574	3.883	-1.301	2.582
Coder 1	1.427	1.583	3.898	-1.301	2.597
Coder 2	1.408	1.574	3.929	-1.301	2.628
Coder 3	1.396	1.565	3.833	-1.301	2.531
Log Transformation of Total Information (mean from 3 coders)	2.412	.179	.666	2.046	2.712
Coder 1	2.427	.184	.600	2.086	2.687
Coder 2	2.419	.184	.733	2.041	2.775
Coder 3	2.391	.185	.778	1.903	2.681

N=240

*Transformation formula is: transformed variable = (variable + .05) $\log_{10}$.

Table 4. Means for Non-transformed Variables by Condition

Variables/Conditions:	Nonverbal Information	Total Information	Nonverbal/ Total Information	Accuracy*
Live				
(mean of 3 coders)	238.389	344.917	.687	.567
Coder 1	236.917	349.333	.672	
Coder 2	251.167	361.667	.689	
Coder 3	227.083	323.750	.701	
Videotape				
(mean of 3 coders)	271.167	372.333	.723	.467
Coder 1	293.917	397.000	.733	
Coder 2	268.583	368.750	.724	
Coder 3	251.000	351.250	.713	
Audiotape				
(mean of 3 coders)	149.028	264.944	.560	.317
Coder 1	157.500	275.333	.569	
Coder 2	143.750	261.750	.546	
Coder 3	143.833	257.750	.565	
Transcript				
(mean of 3 coders)	0	142.389	0	.467
Coder 1	0	139.583	0	
Coder 2	0	151.167	0	
Coder 3	0	136.417	0	

N=240

*Accuracy is a mean score of percentage of correct judgments from subject-receivers in the appropriate condition.

Table 5. Means for Transformed Variables by Condition*

Variables/Conditions	Log Transformation of Nonverbal Information	Log Transformation of Total Information	Accuracy**
Live			
(mean of 3 coders)	2.363	2.527	.567
Coder 1	2.363	2.537	
Coder 2	2.380	2.543	
Coder 3	2.348	2.503	
Videotape			
(mean of 3 coders)	2.416	2.558	.467
Coder 1	2.456	2.593	
Coder 2	2.408	2.550	
Coder 3	2.383	2.530	
Audiotape			
(mean of 3 coders)	2.163	2.417	.317
Coder 1	2.190	2.437	
Coder 2	2.144	2.409	
Coder 3	2.156	2.407	
Transcript			
(mean of 3 coders)	-1.301	2.147	.467
Coder 1	-1.301	2.143	
Coder 2	-1.301	2.174	
Coder 3	-1.301	2.125	

N=60 per cell

*Transformation formula is: transformed variable = (variable + .05)$\log_{10}$.

**Accuracy is a mean score of percentage of correct judgments from subject-receivers in the appropriate condition.

and 2SLS findings.

The dependent variable, accuracy of the truth deception attribution, is a dichotomously dummy-coded variable: 1 if the subject-observer accurately indicated that the subject-source was lying or telling the truth, and 0 if the subject-observer inaccurately indicated that the subject-source was lying or telling the truth. Dichotomous dependent variables violate the assumptions of a number of the analyses performed (ANOVA, LISREL, 2SLS). However, due to the power of these statistical procedures the substance of the results should not be affected.

Performance of an arc-sine transformation upon data reduces this problem to some degree. However, it is questionable how such a transformation would result in further distortion of the data. Hocking et al. (1976) performed an arc-sine transformation on similarly coded data. Results from the transformed and untransformed data were the same. Hocking et al. (1976) chose to use untransformed data due to the distortion problem. In this study an arc-sine transformation was not performed.

The results from this study are presented in four parts: 1) descriptive statistics, 2) analysis of variance, 3) LISREL, and 4) 2SLS. The first two analyses provide information preliminary to the analysis. Two stage least squares follows the LISREL presentation, since many of the choices involving 2SLS were based on problems with the maximum likelihood program.

Descriptive Analysis

The presentation and discussion of the descriptive statistics for each variable are divided into two general areas: 1) overall statistics for transformed variables and non-transformed variables, and 2) means of informational variables by condition in terms of mean accuracy by condition.

General descriptive statistics. Tables 2 and 3 present the means, standard deviations, and ranges for all transformed and non-transformed informational estimates, respectively. Means for coder estimates and summed variables may reflect the same relationship between informational variables. A comparison of Table 2 and Table 3 illustrates no major effect of transformation of variables. Standard deviations are stable across coders as well as means, reflecting the high inter-coder reliability reported earlier (see Appendix A).

More importantly, however, are the wide ranges which can be observed, especially for the non-transformed variables. Often high inter-coder reliability figures reflect the unconscious agreement among coders to not estimate "big" numbers in order to avoid negative reinforcement from the experimenter. The procedure used for training coders in this experiment was extremely vulnerable to this flaw, since estimates were highly abstract, i.e., did not involve counting or using a stopwatch, thus preventing a close empirical check on estimates. Experimenters were aware of this problem of truncated estimates producing false reliabilities throughout the training. The broad ranges reported in Table 2 indicate that high reliabilities (see Appendix A) were not a function of truncated estimates on the part of coders.

Descriptive statistics by condition. Tables 4 and 5, and Figures 7 and 8, indicate a nonlinear relationship between condition and all exogenous variables. Means for informational variables indicate parallel curvilinear relationships by condition. However, mean accuracy scores seem to produce a unique u-shaped curve (see Figure 7 and Figure 8). Though little can be said based on descriptive statistics concerning the significance of the differences between conditions, clearly the relationships between condition and information, and condition and accuracy, are not linear or parallel. The means by condition indicate a rejection of both hypotheses proposed in Chapter I.

However, further analysis is necessary to determine what significant differences exist among conditions. The question also arises as to whether the information curve and the accuracy curve can be predicted on the basis of conditions. In other words, the overall model still needs to be tested, even though the descriptive statistics indicate that the relationship between the variables is nonlinear.

Analysis of variance. One of the major aims of the present research was to examine the ability to make accurate

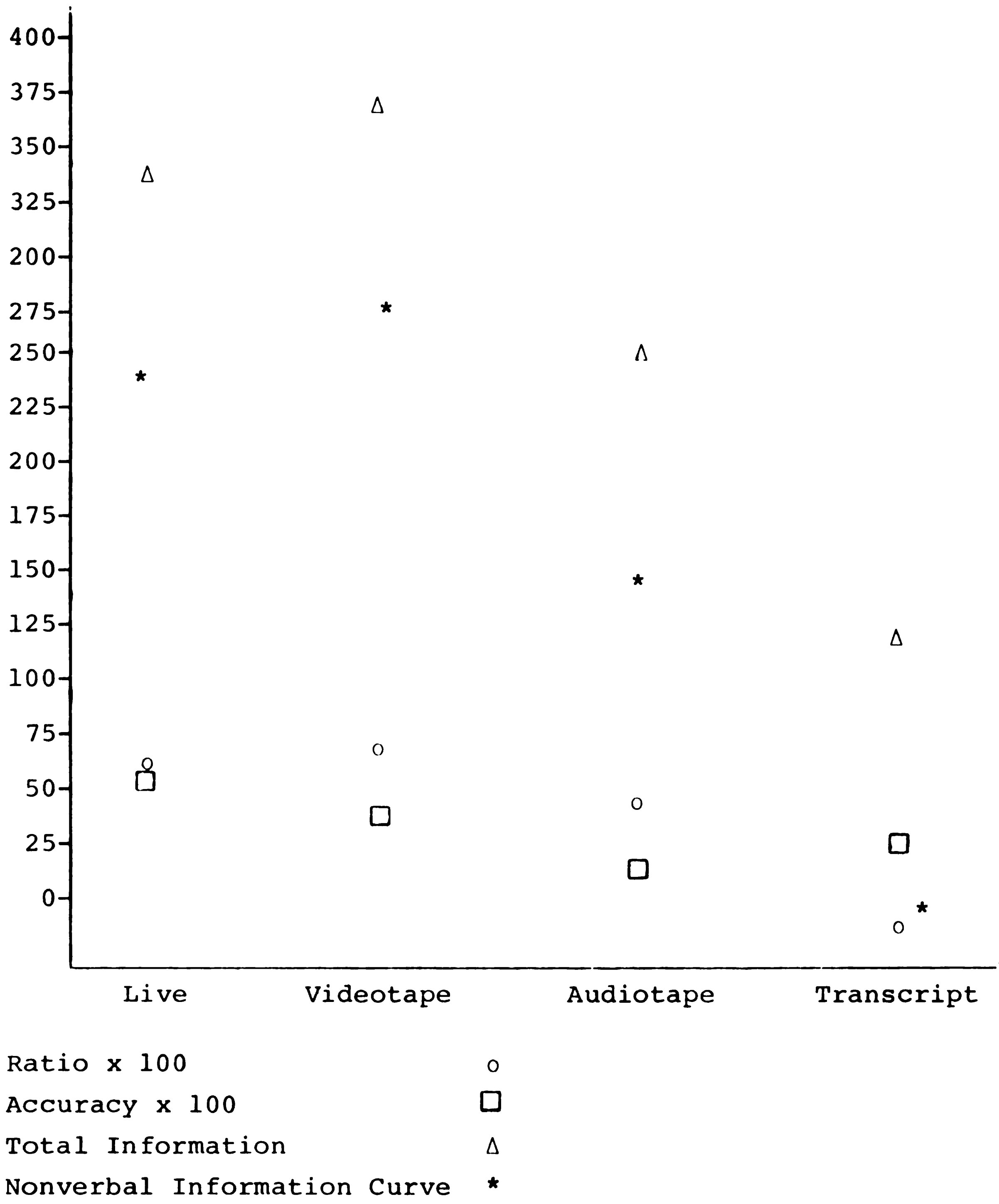


Figure 7. Mean Curves of Nonverbal Information, Total Information, Nonverbal/Total Information and Accuracy of Non-transformed Variables by Channel Condition

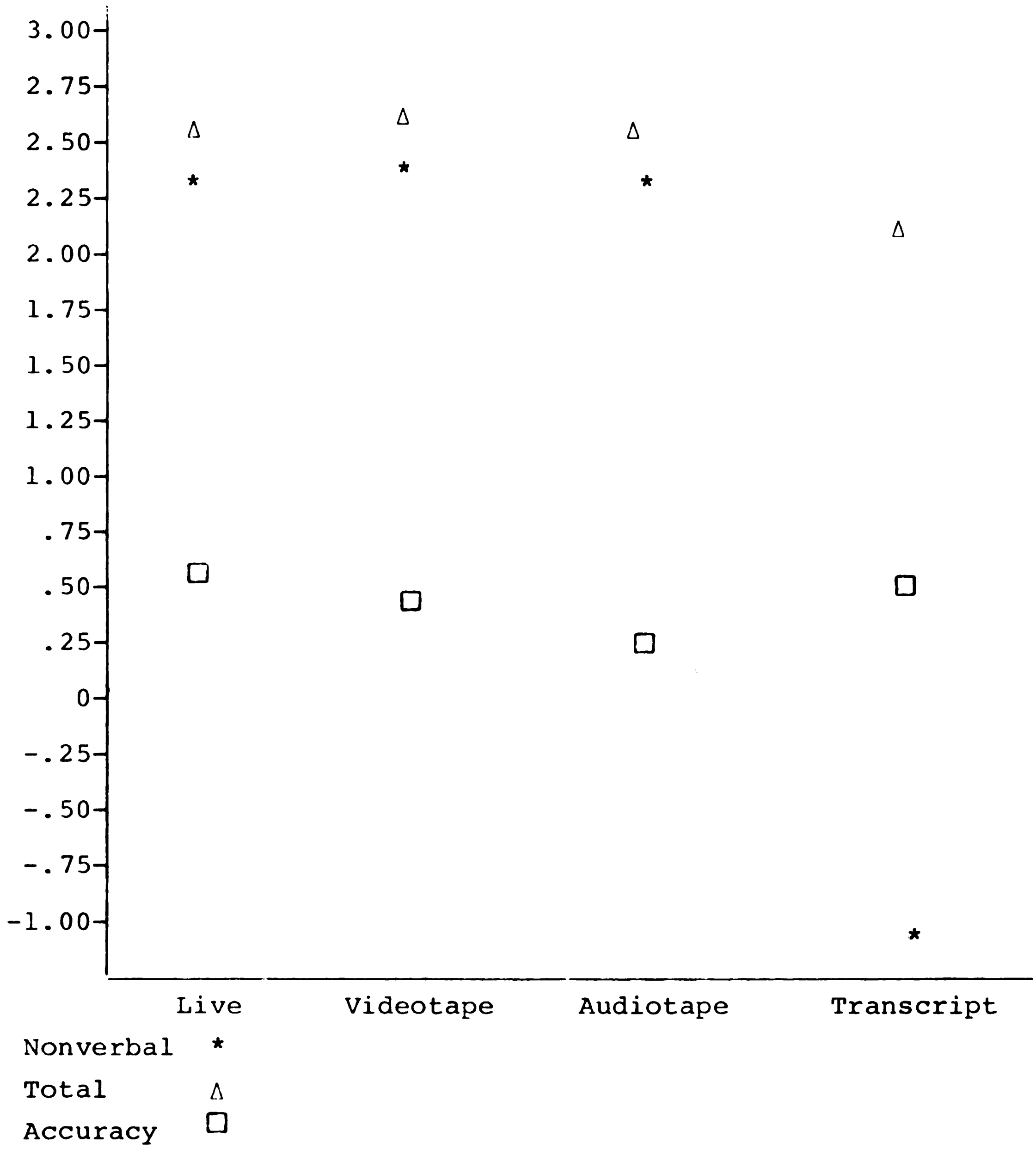


Figure 8. Mean Curves of Nonverbal Information, Total Information, and Accuracy for Transformed Variables by Channel Condition*

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*Transformation formula is: transformed variable = (variable + .05) $\log_{10}$

attributions of veracity under "live," videotape, audiotape, and transcript conditions. While the descriptive statistics indicate a nonlinear relationship between accuracy and condition, it is not obvious whether conditions differ significantly in the way they affect accuracy alone. To shed further light on this issue, an analysis of variance of accuracy scores was conducted. The results (see Table 6) were significant at the .05 level.

A posteriori comparisons of cell means utilizing the Newman-Keuls procedure (Winer, 1971) indicated (see Table 7) that subject-receivers in the live condition are significantly more accurate in attributing truthfulness or deception than observers in the audiotape condition ($p > .05$). No other comparisons are significant.

Identical procedures were also conducted to see to what degree channel conditions significantly differ in terms of available nonverbal information, available total information, and the ratio of available nonverbal to available total information. The results of these analyses (see Table 8, 9 and 10) are significant at the .05 level.

A posteriori comparisons of cell means utilizing the Newman-Keuls procedure (Winer, 1971) indicate that all four channel conditions differ significantly in terms of the available information measures (see Tables 11, 12 and 13).

Table 6. Analysis of Variance of Accuracy by Channel Condition

Source	Sum of Squares	df	MS	F	p
Total	59.496	239	--	---	---
Between	1.913	3	.638	2.613	.05
Within	57.583	236	.244	---	---

Table 7. Individual Comparisons of Channel Condition Accuracy Means*

Channel Condition	Mean
Live	$.567_b$
Video	$.467_a$
Audio	$.316_c$
Transcript	$.467_a$

*Means having different subscripts differ significantly at the .05 level of confidence. The higher the mean, the greater the judgment accuracy.

Table 8. Analysis of Variance of Available Total Information by Channel Condition

Source	Sum of Squares	df	MS	F	p
Total	2654564.340	239	--	---	---
Between	1913871.238	3	637957.080	203.266	<0.001
Within	740693.102	236	3138.530	---	---

Table 9.* Analysis of Variance of Available Nonverbal Information by Channel Condition

Source	Sum of Squares	df	MS	F	p
Total	3142674.896	239	--	---	---
Between	2648214.016	3	882738.005	421.320	<0.001
Within	494460.880	236	2095.173	---	---

*Above calculations are non-transformed. See Appendix H for ANOVAs for Transformed Variables.

Table 10.* Analysis of Variance of the Ratio of Available Nonverbal to Available Total Information by Channel Condition

Source	Sum of Squares	df	MS	F	p
Total	20.505	239	--	---	---
Between	20.2894	3	6.763	7415.560	<0.001
Within	.2152	236	.001	---	---

*Above calculations are non-transformed. See Appendix H for ANOVAs for Transformed Variables.

Table 11.** Individual Comparisons of Channel Condition Available Total Information Means*

Channel Condition	Mean
Live	372.333_e
Videotape	344.917_f
Audiotape	264.944_g
Transcript	142.389_h

*Means having different subscripts differ significantly at the .05 level of confidence.

**Above calculations are on non-transformed variables. See Appendix H for ANOVAs for Transformed Variables.

Table 12.** Individual Comparisons of Channel Condition Available Nonverbal Information Means*

Channel Condition	Mean
Live	238.389_i
Videotape	271.167_j
Audiotape	149.028_k
Transcript	0.000_l

*Means having different subscripts differ significantly at the .05 level of confidence.

**Above calculations are on non-transformed variables. See Appendix H for ANOVAs for Transformed Variables.

Table 13.** Individual Comparisons of Channel Condition Ratio of Available Nonverbal Information to Available Total Information Means*

Channel Condition	Mean
Live	$.6870_m$
Videotape	$.7232_n$
Audiotape	$.5599_o$
Transcript	$.0000_p$

*Means having different subscripts differ significantly at the .05 level of confidence.

**Above calculations are on non-transformed variables. See Appendix H for ANOVAs for Transformed Variables.

<u>LISREL: Testing the total models</u>. LISREL, a program which estimates a linear structural equation system involving multiple indicators of unmeasured variables, was used to solve for the models presented in Figures 5 and 6. LISREL

allows for the use of the coder estimates as multiple indicators of underlying available information measures, for both errors in equations and observed variables, and produces estimates of the disturbance variance-covariance matrix, measurement error variances, and unknown coefficients in the structural equations. Overall, it uses all the data to produce maximum likelihood estimates of parameters and then tests the goodness of fit of the whole system of variables at one time.

Other available methodologies (ordinary least squares, two stage least squares, etc.) do not yield as much information or allow for testing of the goodness of fit of the model as a whole. Given that the descriptive statistics and ANOVAs indicate a rejection of both hypotheses, but a strong relationship between available information measures and condition channel, the added information provided by LISREL is crucial to understanding where and why the proposed models are inadequate.

The model in Figure 5 was tested using LISREL with non-transformed variables; Model I in Figure 9 contains the solution of this test (see Table 14 for a Glossary of Variables in LISREL and 2SLS Models). The model in Figure 6 was tested with LISREL once using non-transformed data (Figure 10, Model II) and once using transformed data (Figure 11, Model III). Model I was not tested with transformed data, since the logarithmic transformation changes the ratio relationship

Table 14. Key for Presentation of All LISREL and 2SLS Models

ξ_1 = Communication Channel (True Variable)

ξ_2 = Communication Channel (True Variable)

ξ_3 = Communication Channel (True Variable)

η_1 = Available Nonverbal Information (True Variable)

η_2 = Available Total Information (True Variable)

η_3 = Available Nonverbal/Available Total Information (True Variable)

η_4 = Ability to Attribute Truth or Deception (True Variable)

ζ_1 = Disturbance Term for η_1

ζ_2 = Disturbance Term for η_2

ζ_3 = Disturbance Term for η_3

ζ_4 = Disturbance Term for η_4

x_1 = Live Condition

x_2 = Videotape Condition

x_3 = Audiotape Condition

y_1 = First Coder's Estimate of η_1

y_2 = Second Coder's Estimate of η_1

y_3 = Third Coder's Estimate of η_1

y_4 = First Coder's Estimate of η_2

y_5 = Second Coder's Estimate of η_2

y_6 = Third Coder's Estimate of η_2

y_7 = First Coder's Estimate of η_3

y_8 = Second Coder's Estimate of η_3

y_9 = Third Coder's Estimate of η_3

y_{10}= Subject-receiver Judgmental Accuracy

ε_1 = Measurement Error of y_1

ε_2 = Measurement Error of y_2

ε_3 = Measurement Error of y_3

ε_4 = Measurement Error of y_4

ε_5 = Measurement Error of y_5

ε_6 = Measurement Error of y_6

ε_7 = Measurement Error of y_7

ε_8 = Measurement Error of y_8

ε_9 = Measurement Error of y_9

$\varepsilon 10$= Measurement Error of y_{10}

δ_1 = Measurement Error of x_1

δ_2 = Measurement Error of x_2

δ_3 = Measurement Error of x_3

Y_1 = Mean Coder Estimate of Available Nonverbal Information

Y_2 = Mean Coder Estimate of Available Total Information

$\hat{Y}_1$ = Predicted Mean Coder Estimate of Available Nonverbal Information

$\hat{Y}_2$ = Predicted Mean Coder Estimate of Available Total Information

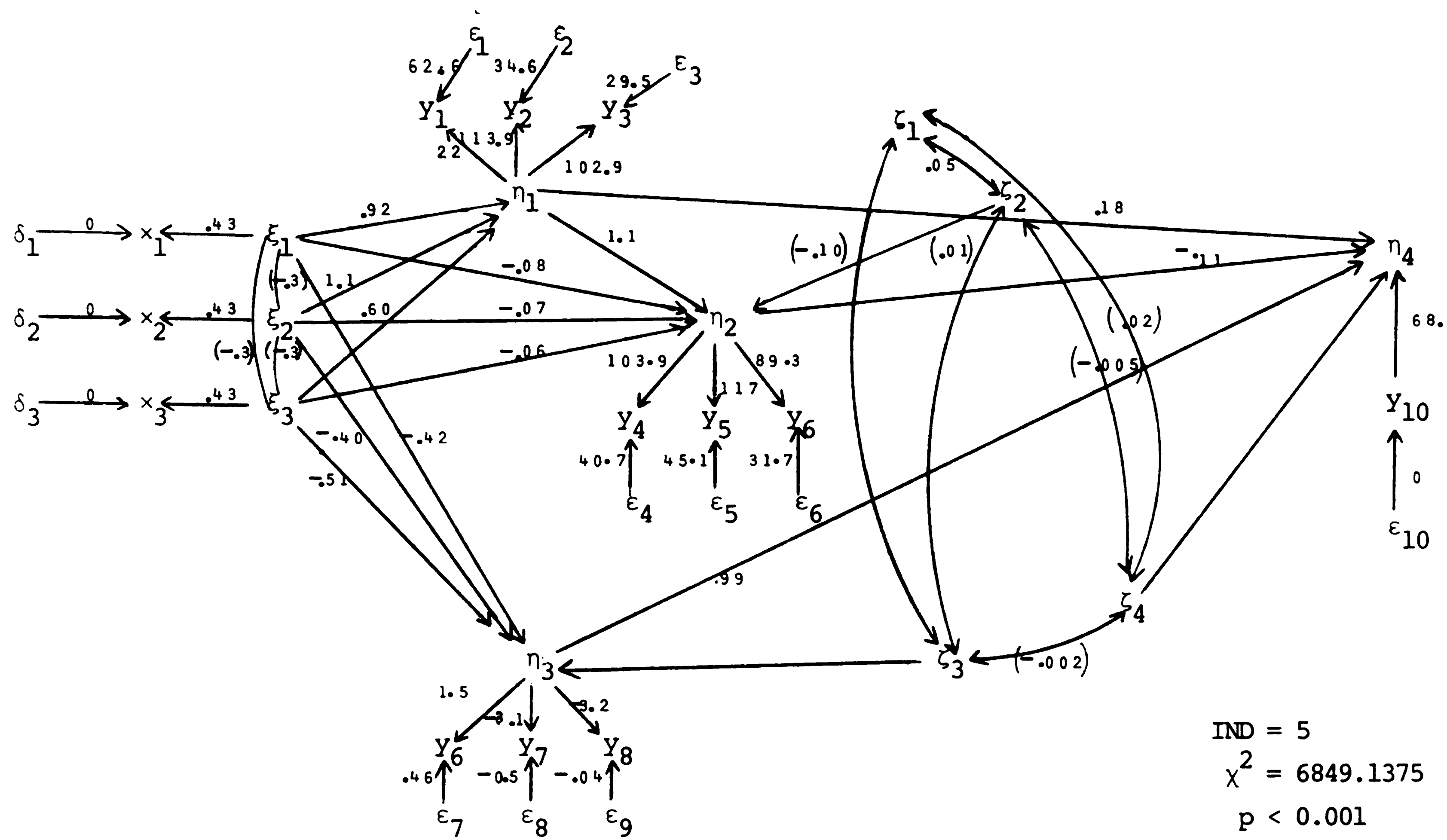
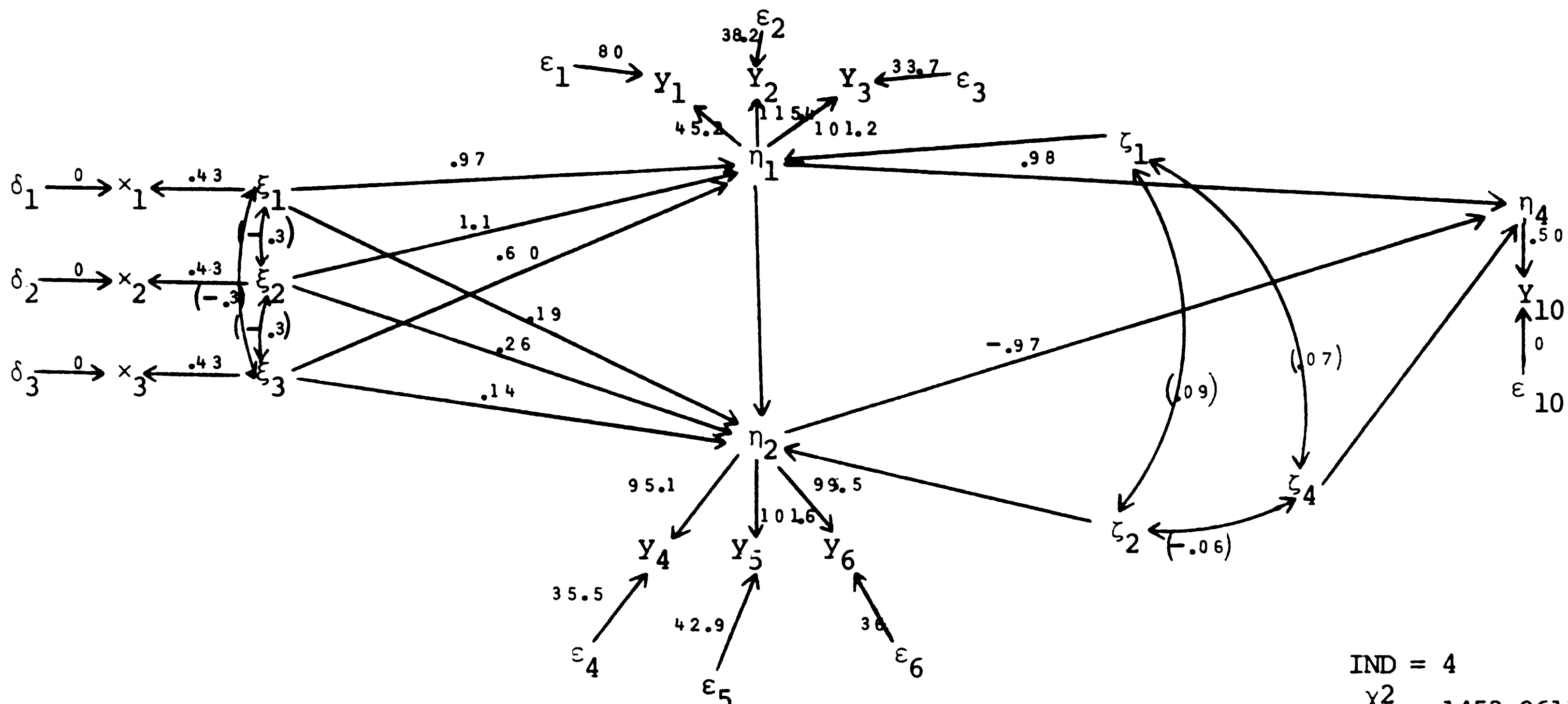


Figure 9: LISREL MODEL I*. The Effects of Condition Channel on Accuracy with Available Nonverbal, Total, and the Ratio of Nonverbal to Total Information as Intermediate Endogenous Variables: Standardized Solution and Non-transformed Variables

IND = 5
χ^2 = 6849.1375
$p < 0.001$
df = 53
N = 240

---

*All correlations are reported in parentheses ( ). For actual matrices see Appendix I.



IND = 4

$\chi^2 = 1453.9611$

$p < 0.001$

df = 30

N = 240

Figure 10: LISREL MODEL II. The Effects of Channel Condition on Accuracy with Available Nonverbal and Total Information as Intermediate Endogenous Variables: Standardized Solution and Non-transformed Variables*

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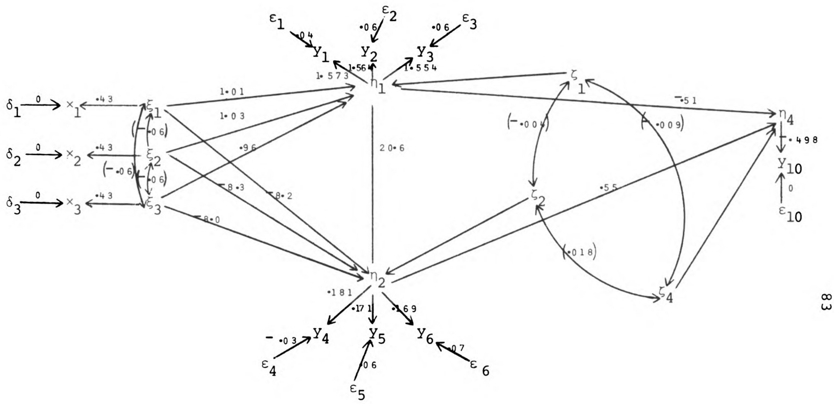
*All correlations are reported in parentheses ( ). For actual matrices see Appendix I.



IND = 2

$\chi^2 = 610.091$

$p < 0.001$

df = 30

N = 240

Figure 11: LISREL MODEL III. The Effects of Channel Condition on Accuracy with Available Nonverbal and Total Information as Intermediate Endogenous Variables: Standardized Solution and Transformed Variables*

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*All correlations are reported in parentheses ( ). For actual matrices see Appendix I. Transformation formula is: transformed variable = (variable + .05) $\log_{10}$

to a subtractive relation, i.e. the hypothesized relationship is destroyed in the data. For all LISREL testing the raw data served as input, and a variance-covariance matrix was calculated upon which the remaining procedures were performed (for details concerning LISREL analyses, see Appendix I).

Due to a problem with LISREL an exact solution is not reported for any of the models tested; all estimated parameters are approximate and therefore the chi-square does not represent the goodness of fit of the final models. In testing the models, the LISREL program consistently produced IND $\neq$ 0. Jöreskog and Van Thillo (1972) indicate the following concerning this problem:

> If IND is 1, 2, or 3, "serious problems" have been encountered and the minimization of the function cannot continue. One reason for this may be erroneous input data. Another reason may be that insufficient arithmetic precision is used (in the program) (p. 33).

The IND obtained for the reported models are contained in the corresponding figures. INDs of 4 and 5 indicate that the program has run out of the allocated time or has completed the maximum number of minimizations allowed in one cycle. The models reported with these INDs (Figures 9 and 10) were resubmitted; the program yielded IND=2, but no new solution.

Given the nature of the solutions, it was questionable whether the reported parameters were reliable. All solutions indicate the model did not fit ($p < 0.001$). However, due to the problems encountered, it was decided to solve for the best of the three models (Figure 11) using 2SLS. Model III was chosen since it was the only solution obtained by pushing the LISREL beyond its time and/or minimization constraints, and this model had the lowest chi-square value (610.91), i.e., was the most likely model to fit.

The low correlations between the residuals in Model III (-.004, .008, .009) suggest that any failure in the fit of the model is not due to any missing relevant variable, but rather to inadequate predictive power among the variables in the model. A small R^2 in a 2SLS solution would confirm this interpretation of the LISREL solution.

The paths from the ratio of available nonverbal to total information and available nonverbal information to accuracy support the directional indications of Hypotheses 1 and 2 (Model I: NV → ACC = -.11, NV/TOT → ACC = .99; Model II: NV → ACC = -.97; Model III: NV → ACC = -.51). However, little can be said about the highly unstable paths in a LISREL solution which is a poor fit; at best we would hope that the 2SLS yields path coefficients of similar magnitude and direction to LISREL results.

2SLS: Testing of the total model. The first stage of the 2SLS procedure consists of ordinary least squares regression. In this case, two separate equations had to be estimated; the first to determine the path coefficients between available nonverbal information and the exogenous variables, and the second to determine the paths between available total information and the exogenous, as well as available nonverbal information variables.

Table 15 illustrates the results obtained from estimation of the first stage, first equation. It was assumed earlier that variations in the communication channel would result in covariations in coders' perceptions of the amount of available nonverbal information. The results strongly support this assumption, with variations in the channel accounting for .997 percent of the variance in perceived available nonverbal information. These results also serve as an indirect check of the success of the experimental procedure for manipulating available information (i.e., in terms of communication channel).

It was also assumed that channel variations, as well as available nonverbal information, would result in variations in coders' perceptions of available total information. Table 16 illustrates the results pertaining to this assumption. Again, the results are overwhelmingly supportive (R^2 = .969), and also serve as an indirect check of the experimental procedure for controlling the availability of information, a crucial variable in the present study.

The results pertaining to channel variation and information availability are fairly straightforward and not particularly surprising. Of greater importance are the results pertaining to information availability as a predictor of the

Table 15. First Stage, First Equation of Two-Stage Least Squares Model*

Dummy Variable Structural Model**	F	$p<.05$	Multiple R	R^2
$Y_1 = a + b_0U + b_1X_1 + b_2X_2 + b_3X_3 + b_{K-1}X_{K-1} + E$	27956.6	yes	.998	.997
$Y_1 = -1.30 + 3.66X_1 + 3.72X_2 + 3.46X_3$				

Variable	b	df	F	$p<.05$
x_1	3.66	3/236	57241.2	yes
x_2	3.72	3/236	58880.2	yes
x_3	3.46	3/236	51165.0	yes
N = 240				

*Transformation formula is: transformed variable = (variable + .05)$\log_{10}$.

**See Namboodiri, Carter and Blalock (1975), pp. 138-39, for a discussion of dummy-variable regression analysis. Refer to Table 14 for glossary.

Table 16. First Stage, Second Equation of Two-Stage Least Squares Regression Model*

Dummy Variable Structural Model	F	$p<.05$	Multiple R	R^2
$Y_2 = a + b_0U + b_2X_2 + b_3X_3 + b_4Y_1 + b_{K-1}X_{K-1} + E$	1883.92	yes	.984	.969
$Y_2 = 3.22 - 2.64X_1 - 2.65X_2 - 2.58X_3 - 8.24Y_1$				

Variable	b	df	F	$p<.05$
x_1	-.264	4/235	873.07	yes
x_2	-.265	4/235	857.18	yes
x_3	-.258	4/235	936.21	yes
Y_1	.824	4/235	1147.47	yes

N = 240

*Transformation formula is: transformed variable = (variable + .05)$\log_{10}$.

ability to make accurate attributions of veracity. By using the two-stage least squares procedure, the endogenous variables in the structural model could be "purified" in such a way that their correlations with disturbance terms were eliminated. Thus, given that we had little measurement or sampling error, we should get a fairly accurate estimate of the relation between information availability and subject-receiver accuracy.

Table 17 illustrates the results obtained from this procedure. Examination of these results suggests that variations in availability of informational cues as a function of communication channel do not predict judgmental accuracy very well. The multiple R was only .064, accounting for less than one percent of the variance in accuracy scores. However, it should be noted that the path from available nonverbal information to accuracy is both stable and negative as hypothesized in the first hypothesis.

Compairson of LISREL and 2 SLS: Table 18 compares the results of the 2 SLS with the LISREL results for Model III. All paths are of similar magnitude and in the same direction (positive or negative). The goodness of fit test of LISREL does not support the model ($X^2 = 610.091$, $p < 0.001$). Examination of the three 2SLS equations indicates that the first stage of the model, which explains over 99.7% of the variance in the first stage, has relatively stable paths (low standard errors) and yields a significant F, is not the source of the

Table 17. Second Stage, Third Equation of Two-Stage Least Squares Regression Model*

Structural Model	F	p<.05	Multiple R	R^2
$Y_3 = a + b_1\hat{Y}_1 + b_2\hat{Y}_2 + E$	.481	no	.064	.004
$Y_3 = -.428 - .004\hat{Y}_1 + .389\hat{Y}_2$				

Variables	b	df	F	p<.05
$\hat{Y}_1$	-.004	2/237	.825	no
$\hat{Y}_2$	-.389	2/237	.956	no

N = 240

*Transformation formula is: transformed variable = (variable + .05) $\log_{10}$.

Table 18. Comparison of Standardized Results of LISREL and 2SLS for Model III

Items	LISREL	2SLS	Standard Error of 2SLS Beta
1st Equation			
Paths:			
Live → Nonverbal Information	1.014	1.010	.002
Videotape → Nonverbal Information	1.032	1.025	.002
Audiotape → Nonverbal Information	.961	.955	.002
R^2	--	.997	--
F	--	27956.603	--
Significance level	--	$p<0.05$	
2nd Equation			
Paths:			
Live → Total Information	-8.200	-6.407	.009
Videotape → Total Information	-8.257	-6.438	.009
Audiotape → Total Information	-7.978	-6.273	.008
Nonverbal Information - Total Information	9.020	7.254	.002
R^2	--	.970	--
F	--	1883.917	--
Significance level	--	$p<0.05$	
3rd Equation			
Paths:			
Nonverbal Information → Accuracy	-.507	-.128	.004
Total Information → Accuracy	.551	.138	.399
R^2	--	.004	--
F	--	.48176	--
Significance level	--	$p<0.05$	
MODEL III:			
χ^2	610.091	--	--
Probability	$p<0.001$	--	--

poor fit of the data to the model. Examination of the third equation indicates that the path from total available information ($\hat{Y}_2$) to accuracy ($\hat{Y}_3$) is unstable (large standard error). The second stage of the 2SLS, which explains less than 1% of the variance in accuracy, suggests the reason for poor fit of the maximum likelihood estimate of the model.

As mentioned earlier, the direction of the available nonverbal information to accuracy path supports Hypothesis 1.

CHAPTER IV

DISCUSSION

The purpose of this chapter is to interpret the results of the experiment, to discuss practical and theoretical implications, to evaluate procedures, and to suggest future research.

Summary of Findings

Even though channel conditions systematically vary in terms of information, the differences have little effect on accuracy. In general, the results of this experiment do not support the hypotheses proposed in Chapter I:

H_1: As transmission channel increases the amount of nonverbal information available to a receiver, the accuracy of a truth/deception attribution concerning an unfamiliar source will decrease.

H_2: As transmission channel causes an increase in the ratio of nonverbal to total information available to a receiver, the accuracy of the truth/deception attribution concerning an unfamiliar source will increase.

Channel conditions with significantly differing amounts of available nonverbal information and the ratio of available nonverbal to total information--videotape and transcript--yielded comparable levels of accuracy.

Table 19. Summary of Analyses' Relation to Hypotheses

H_1: As transmission channel causes an increase in the ratio of non-verbal to total information available to a receiver, the accuracy of the truth/deception attribution concerning an unfamilar source will decrease	H_2: As transmission channel causes an increase in the ratio of non-verbal to total information available to a receiver, the accuracy of the truth/deception attribution concerning an unfamilar source will increase

Analysis	Relationship to H_1	Relationship to H_2
Descriptive Statistics		
General		
Table 2	None	None
Table 3	None	None
By Condition		
Table 4	Not supported	Not supported
Table 5	Not supported	Not supported
Figure 7	Not supported	Not supported
Figure 8	Not supported	Not supported
Analysis of Variance		
Table 6 and 7	Not supported	Not supported
Table 8 and 11	None	None
Table 9 and 12	None	None
Table 10 and 13	None	None
LISREL		
Figure 9: Model I	Generally inconclusive; direction of NV → ACC supports H_1	Generally inconclusive; direction of NV/TOT → ACC supports H_2
Figure 10: Model II	Generally inconclusive; direction of NV → ACC path supports H_1	None
Figure 11. Model III	Generally inconclusive; direction of NV → ACC path supports H_1	None
2SLS		
Table 15	None	None
Table 16	None	None
Table 17	Direction of NV → ACC path supportive of H_1 and stable; variance explained is not significant	None

In Chapter I, when presenting the two hypotheses, three theoretical perspectives concerning information processing were discussed as possible explanations for the truth/deception attribution process: 1) a traditional information utility hypotheses, 2) the distraction hypotheses, and 3) the overload hypothesis. The former predicts an increase in accuracy as more information becomes available, while the latter two predict a drop in accuracy as information increases due to two different processes. All three of these perspectives were not supported by these results.

The high accuracy score in the transcript condition (46.7%) is counter to the information utility hypothesis and rules out any linear relationship between available nonverbal and/or total information and the ability of untrained observers to detect deception on the part of strangers. The comparatively high mean accuracy observed in the transcript condition suggests that an attribute of that channel, distinct from type and amount of information, may provide an explanation. Amount of time an observer has to examine the stimulus and the ability of the observer to reexamine the stimulus may be two such attributes of transcripts of interest in future research. Both these sets of findings are supported by past research: (1) the low accuracy scores found by Maier and Thurber (1968), 58.3%, and Hocking _et al_. (1976), 58.5%, in the conditions where information was most abundant; (2) the conclusion of Maier and Janzen (1967) that judgments of accuracy "seemed to be based upon impressions rather than logic" (p. 105); and (3) the high accuracy scores found by Maier and Thurber (1968) and Hocking et al.(1976) in transcript conditions.

The distraction and the overload hypothesis are called into question by the high accuracy scores in the live and the videotape conditions (56.7%, 46.7%). These hypotheses would predict that channel conditions which provided the most available information (videotape) and offered the greatest amount of distracting external cues (live) would yield the lowest accuracy scores. Again, the comparable accuracy scores of the videotape and live channel condition, which represent the most extreme differences in amounts of all types of available information, suggests that these informational hypotheses offer inappropriate explanations for the truth/deception attribution.

Implications

Upon close examination of the results a series of findings calls into question any causal relationship between amount of information and accuracy of attributions. First, coders consistently judged videotape as providing more information than live presentations (see Tables 3 and 4). Recalling that coders were measuring the amount of information available for them to examine, this finding seems somewhat strange. Videotape limits the amount of space the receiver can visualize at one time, and often causes a loss of detail due to poor pictures, glare, and camera shot. Likewise, on videotape, the source is smaller. Could it be that in a live situation, the receiver is distracted by external stimuli which have no informational value, thus missing many of the informational cues given by the source? Second, even though the live condition was judged to provide less information than the videotape, accuracy in the former condition was higher ($M_{videotape} = .467$, $M_{live} = .567$). If the live condition suffers from distraction, does this contribute to accuracy? Finally, what unique characteristics of the audiotape condition produce such a significantly lower accuracy score? Overall these disjointed findings suggest that other variables beside information affect accuracy of judgments; it seems that a big difference among channels makes almost no difference in terms of accuracy of the truth/deception attribution.

Nonverbal communication has been carefully examined over the years. The importance of the nonverbal component of messages has been emphasized in both scholarly journals and popular paperbacks. Mehrabian (1971b, p. 43) has even said that 93% of the impact of a message comes from nonverbal communication. A long list of studies (see Table 1) dating back to 1926 suggests that researchers feel nonverbal information may be an important influence in the truth/deception attribution process. These findings suggest that if nonverbal communication has an influence on detecting deception, it is not in terms of accuracy. Hocking (1976) comes to a similar conclusion when he states, "the results of the present experiment suggest that for accurately detecting deceptive communication, the nonverbal component is less important than the verbal component" (p. 120).

In fact, considering the relatively low accuracy scores reported in all conditions--56.7% for the live, 46.7% for the videotape and transcript, and 31.6% for the audiotape--it is highly questionable whether untrained observers can accurately detect deception on the part of strangers. None of the mean accuracy scores were much higher than the 50% criterion researchers have defined as chance accuracy in these studies. It should be noted that this criterion is arbitrary in the sense that all people may not expect sources to be lying 50% of the time. However, in the present study subject-receivers knew that there was a 50/50 chance that each of the subject-sources was lying.

A few studies have obtained accuracy scores significantly above the 50% criterion. Specifically these were in Maier and Thurber's (1968) audio-only and transcript conditions, Ekman and Friesen's (1974) body-only condition, and Hocking _et al._'s (1976) audio-only and transcript conditions. However, the two types of deception-inducing procedures used in these studies can be criticized for problems which inflate accuracy scores. Maier and Thurber (1968) had students role-play deceivers. When role-playing, lying behavior is not inconsistent with the matters of known fact to the subject; (s)he acts as he believes someone who is lying acts. When playing the part of a liar the tendency is to emphasize "lying behavior." The subject has no real motivation to look honest, as in the normal lying situation; rather (s)he wants to look like a liar if (s)he is to do an effective job. If an individual role-playing a liar looked honest, would anyone think (s)he was playing the role well? Such a technique, at worst, inflates the accuracy scores of observers, while at best has been seriously questioned as a research technique, since no one seems to know whether role-players "know" how real life liars behave (Freedman, 1969).

In both Ekman and Friesen (1974) and Hocking *et al.* (1976) individuals always lied while observing a very unpleasant stimulus and told the truth while viewing a pleasant stimulus; this systematically increased the cues of discomfort and arousal coming from the group of liars. These cues of arousal would be attributed by observers to lying rather than any extraneous stimulus, since that was the explanation offered by the social context in which observers made their attributions, i.e., a detecting deception experiment (cf. Schachter and Singer, 1962). The arousal cues stemming from the unpleasant stimulus, thus, would have made it easier for observers to identify liars.

The deception-inducing procedure used in this study was chosen to overcome some of the criticism of past deception-inducing techniques. The authors realized that a more generalizable deception-inducing technique might logically produce lower accuracy scores than role-playing or the technique involving the viewing of an unpleasant stimulus; the resultant accuracy scores (56.7%, 46.7%, 46.7%, 31.6%) were lower than, but we believe more generalizable than, past scores. Given the criticism of past deception-inducing techniques, the generally low scores found under these past techniques, and the low scores found in the present study, the claim that untrained observers can accurately detect deception on the part of strangers is highly questionable.

Problems With the Study

As with all research, this study has a number of problems which must be discussed and examined in terms of their implications. Most importantly they should be viewed as an argument for replication and refinement before drawing any final conclusions.

Two basic principles of scientific experimentation are random assignment of subjects to conditions and random sampling of subjects from the population; the former safeguards internal validity, the latter external validity. Unfortunately, neither one of these principles was strickly adhered to in this research.

All subject-receivers, subject-sources, and coders were undergraduate students in the Department of Communication at Michigan State University. Individuals signed up to participate in the research on a voluntary basis in exchange for extra credit in an introductory communication course.

Statistically these results are only generalizable to a student population. The sample used is not representative of the general population and may possess unique characteristics which affected the outcome of the study. Students may be more/less suspicious of their peers than the average individual engaged in conversation. This would affect the degree to which they have attempted to detect deception in the past, and therefore their present accuracy scores. This study should be replicated among a more heterogenous sample and measures should be taken of general levels of suspicion.

Every attempt was made to randomly assign individuals to conditions; however, due to the nature of volunteer student subjects, individuals often had to switched from one condition to another. These minor adjustments, however, should not have had any major impact on the results of the study.

Subject-observers experienced interviews over a three-week period. Therefore it is possible that individuals who had already participated had discussions with others who had not yet participated. The knowledge gained through these conversations could have influenced future subject-receivers' performances. However, since the cells were assigned to days randomly, this should not have systematically affected results.

Due to the constraints of the manipulation, the live condition was run under different circumstances and in a different laboratory setting than the other three conditions. This might cause the subject-receivers in the live condition to behave differently for reasons separate from the nature of the channel condition itself. However, given the overall pattern of the results, this change in environment does not seem to have had a significant effect.

In this study a number of participants were engaging in various differing roles simultaneously. Although random assignment was adhered to in all conditions, a number of systematic interactions of individuals roles, etc. could have contaminated results. Ideally correlations between all possible contaminating variables should be reported. However, given the precautions taken and the intricacies of such analyses, and the degree to which past research supports conclusions these correlations do not appear. Replication under less complex circumstances is the best confirmatory evidence for these findings.

Overall, the problems encountered in this experiment do not seem to be of the type which would casue a major difference in the outcome. However, replication using a random sample from a more heterogenous population, greater controls, and strict random assignment would add considerable confidence to the findings reported here.

Future Research

These findings suggest a number of areas of future research which may prove fruitful. All research in the area of detection of deception thus far has examined the process in terms of stranger dyad. Perhaps we should investigate deception detection in established relational settings. Miller and Steinberg (1975) suggest that when an individual engages in interpersonal communication the accuracy of predictions about the other increases. Accuracy increases because interpersonal communication involves knowledge on the part of the observer concerning the idiosyncrasies of the other. Prediction dominated by "stimulus discrimination" based on this knowledge should be more accurate than "stimulus generalization" based on stereotypes, which characterizes noninterpersonal communication (Miller and Steinberg, 1975). Miller and Steinberg's conception of interpersonal communication would predict higher accuracy on the part of observers who communicate interpersonally with the source, due to the increased knowledge those observers have concerning the source's lying and "truthing" behavior. Examination of accuracy in detection of deception between source and receivers who have interpersonal relationships may prove fruitful in terms of the work of Miller and Steinberg.

One way to test the degree to which type of relationship affects the accuracy of the truth deception attribution is to do a field study where members of dyads of various degrees of familiarity attempt to tell if the other is lying or telling the truth. Various levels of the relational variable could be operationalized through using strangers, couples who have been dating about a month, engaged couples, and couples married over 10 years. A parallel laboratory experiment--same manipulation, confederate, experimenter, and questionnaire--could be done recontrolling for the number of times subject-observers would be allowed to view interviews of strangers; this gives researchers information as to whether amount of time of contact, alone, or some other qualitative component of relationship contributed to accuracy.

Hocking (1976) also suggests that lying behavior may not be the same across individuals, but rather is distinguishable from "truthing" behavior only within individuals, based on differences between each individual's own lying and "truthing" behavior. In that case, detailed knowledge available to individuals in an interpersonal relationship as to the "truthing" behaviors of the source would be necessary in order to notice deviations. Possible research in this direction calls for careful cue analysis of videotapes of the samples of the same individual's lying and truthing behavior. Hocking's (1976) hypothesis that lying behavior is a deviation from the individual's idosyncratic truthing behavior could be examined by comparing the cue analysis of lying and truthing segments within each subject, rather than across subjects.

Though nonverbal behavior does not seem to be related to the accuracy of the truth/deception attribution, nonverbal stereotypes may produce inaccuracy in the attribution. People may develop stereotypic conceptions of how certain nonverbal behavior indicates deception. In other words, based on nonverbal behavior, people may think they are being lied to even though they are not. Knowledge as to the stereotypes people have of liars could be obtained by comparing the cue analyses of segments observers judged as lying with segments observers judged as truthing.

APPENDIX A

Inter-coder Reliability for Non-transformed and Transformed Variables

APPENDIX A

Table A1

Inter-coder Reliability for Non-transformed and Transformed Variables*

Variables	Unstandardized Reliability Coefficient	Standardized Reliability Coefficient
Nonverbal Information	.98157	.98302
Total Information	.96285	.96432
Nonverbal Information/ Total Information	.99287	.99287
Log Transformation of Nonverbal Information	.99957	.99958
Log Transformation of Total Information	.96780	.96781

N = 240
Coders = 3

*Cronbach's Alpha $p < .05$.
Transformation formula is: transformed variable = (variable +.05)$\log_{10}$.

APPENDIX B

Instructions and Questionnaire for Standard Interval Pretest

APPENDIX B

Instructions and Questionnaire for Standard Interval Pretest

Michigan State University
Department of Communication
Winter 1976

We all have heard the saying that "How you say something is just as important as what you say." Over the years social scientists have been interested in what are the sources of information people use when they communicate. As you are probably aware, NONVERBAL behaviors (the look on your face, the way you move your hands and legs, how loud and fast you speak, whether you look the other person in the eye, etc.) often express a great deal about the way we feel, as well as what our words are intended to mean, when we talk to others. In fact, the popularity of books like Julius Fast's Body Language shows that the general public wants information on how and when "actions speak louder than words."

You are participating in part of an ongoing research project being conducted by the Department of Communication here at Michigan State University, which deals with NONVERBAL communication. We want you to help us find out how much people use NONVERBAL behaviors of others, in relation to the TOTAL amount of information the others provide, in order to interpret the others' messages.

We need to know how much of the TOTAL INFORMATION you get when you watch someone speak, comes from their NONVERBAL BEHAVIORS (facial expression, eye contact, nodding hand and body movement, posture, pausing, the ums and ahs, anything besides their words).

In order to do this, we will show you a series of short videotaped interviews with students. You have to tell us two things about these interviews: (1) HOW MUCH NONVERBAL INFORMATION did the interview provide? and (2) HOW MUCH TOTAL INFORMATION did the interview provide?

HERE IS HOW WE WANT YOU TO GIVE US THE ABOVE INFORMATION:

We measure the amount of NONVERBAL INFORMATION provided by a person in "NVs." An "NV" is a conceptual quantity, much as an ounce is a unit of physical quantity or weight. The greater the amount of nonverbal information present in the interview, the greater the number of "NVs" you should assign it.

Similarly, we measure the TOTAL AMOUNT OF INFORMATION provided by a person in an interview in "TOTs"; a "TOT" is like an "NV"--it is a unit of conceptual quantity, much as an ounce is a unit of physical quantity or weight. The greater the amount of total information in the interview, the greater the number of "TOTs" you will want to assign to that interview.

The first interview you will see will serve as the basis for all other judgements about information that you make; SO WATCH THE FIRST INTERVIEW CAREFULLY. You will see the first interview three times. We are telling you that there are 150 TOTs (units of total information) in the first interview. Now look at the first interview and think of these numbers: TOTs = 150, NVs = 100.

WATCH SCREEN

After you see this interview a couple more times we are going to ask you to use it to estimate the amount and kinds of information in other interviews. So when you see interview #2 you will be answering the following two questions:

(1) If interview #1 had 150 TOTs, how many TOTs are there in interview #2?

(2) If interview #1 had 100 NVs, how many NVs are there in interview #2?

Now look at interview #1 two more times. Remember TOTs (total information) = 150. NVs (nonverbal information) = 100.

WATCH SCREEN

Now here is interview #2. Try to estimate the following:

NVs = ______________ TOTs = __________________

If you think there was twice as much total information in #2 as in #1 you should have written TOTs = 300. If you think there was 1/2 as much nonverbal information, you should have written NVs = 50.

Now we are ready to start. Are there any questions? You will see the first interview on the screen to your right before every other estimate you make. REMEMBER the first interview TOTs = 150 and NVs = 100. Upon these numbers you base all other estimates.

When you are finished, we will collect your questionnaires, and you are free to ask any questions you like. We appreciate your help and hope it will contribute to your knowledge of communication. WORK FAST. DO NOT DISCUSS YOUR ANSWERS WITH NEIGHBORS. DO NOT GO BACK AND CHANGE ANSWERS. WE ARE INTERESTED IN YOUR SPONTANEOUS PERCEPTIONS AND JUDGEMENTS.

INTERVIEW #3

TOTs = ____________________ NVs = ____________________

INTERVIEW #4

TOTs = ____________________ NVs = ____________________

INTERVIEW #5

TOTs = ____________________ NVs = ____________________

INTERVIEW #6

TOTs = ____________________ NVs = ____________________

INTERVIEW #7

TOTs = ____________________ NVs = ____________________

INTERVIEW #8

TOTs = ____________________ NVs = ____________________

INTERVIEW #9

TOTs = ____________________ NVs = ____________________

INTERVIEW #10

TOTs = ____________________ NVs = ____________________

INTERVIEW #11

TOTs = ____________________ NVs = ____________________

INTERVIEW #12

TOTs = ____________________ NVs = ____________________

INTERVIEW #13

TOTs = ____________________ NVs = ____________________

INTERVIEW #14

TOTs = ____________________ NVs = ____________________

INTERVIEW #15

TOTs = ____________________ NVs = ____________________

INTERVIEW #16

TOTs = ____________________ NVs = ____________________

INTERVIEW #17

TOTs = ____________________ NVs = ____________________

INTERVIEW #3

NVs = ______________ TOTs = ______________

INTERVIEW #4

NVs = ______________ TOTs = ______________

INTERVIEW #5

NVs = ______________ TOTs = ______________

INTERVIEW #6

NVs = ______________ TOTs = ______________

INTERVIEW #7

NVs = ______________ TOTs = ______________

INTERVIEW #8

NVs = ______________ TOTs = ______________

INTERVIEW #9

NVs = ______________ TOTs = ______________

INTERVIEW #10

NVs = ______________ TOTs = ______________

INTERVIEW #11

NVs = ______________ TOTs = ______________

INTERVIEW #12

NVs = ______________ TOTs = ______________

INTERVIEW #13

NVs = ______________ TOTs = ______________

INTERVIEW #14

NVs = ______________ TOTs = ______________

INTERVIEW #15

NVs = ______________ TOTs = ______________

INTERVIEW #16

NVs = ______________ TOTs = ______________

INTERVIEW #17

NVs = ______________ TOTs = ______________

APPENDIX C

Questionnaire for Coder Information Estimates

APPENDIX C

Questionnaire for Coder Information Estimates

	columns
Michigan State University Department of Communication	
Project Number: 0476	1-4 __ __ __ __
Coder Number: ____	5 ___
Coder Group: 1__, 2__, 3__, 4__	6 ___
Condition: Live (1)___ Video (2)___ Audio (3)___ Transcript (4)___	7 ___
Sex of Coder: (0)male___ (1)female___	8 ___
1st Participant Viewed: ______	9-10 ____ ____
Sex of 1st Participant: (0)male___ (1)female___	11 ___
NVs: ______	12-15 __ __ __ __
TOTs: ______	16-19 __ __ __ __
2nd Participant Viewed: ______	20-21 ____ ____
Sex of 2nd Participant: (0)male___ (1)female___	22 ___
NVs: ______	23-26 __ __ __ __
TOTs: ______	27-30 __ __ __ __
3rd Participant Viewed: ______	31-32 ____ ____
Sex of 3rd Participant: (0)male___ (1)female___	33 ___
NVs: ______	34-37 __ __ __ __
TOTs: ______	38-41 __ __ __ __
Card No.	80 ___

APPENDIX D

Introduction to Subject-sources

APPENDIX D

Introduction to Subject-sources

As was explained to you in class, the National Science Foundation has funded a grant to examine the effects of group size and the sex of group members on group success and problem-solving strategies. We have brought together four-, three-, and two-man groups, in addition to individuals; some of the groups are all one sex, while others are composed of various combinations of the two sexes. Each group will be asked to perform the same task. The task is contentless in that it requires no specific knowledge of any subject matter or any specific skill. This was done so as to prevent anyone's past education or history from helping them do extremely well. We are interested in what size and sex combination groups do the best. We also are interested in finding out if some problem-solving strategies help various size groups do well, while others work better for different size groups.

The government hopes to use this information as guidance for what size work groups, of what combination of the two sexes, and what strategies will work best for various government task forces. Later experiments will vary the type of problem groups are asked to perform; first, however, we want to deal with simpler tasks.

Since these results will have real effects for the way our government will be restructured, it is important you pay attention and take this seriously. Now the contentless task you will be asked to perform is rather simple, but also rather boring. So, in order to increase interest in the task, we are using some of the funds provided by the National Science Foundation to give prizes to the most successful groups. The group that does the best in each size category will receive $50 to divide among its members. There are six groups of each size category. Since you were assigned to the dyad size category you will have to do better than five other dyads in order to get $25 apiece. In about four weeks you will receive a letter letting you know if your group won; if it did there will be a check enclosed with the letter.

The task simply involves you working as a team to estimate the number of dots on each card I show you. There are nine cards. I will show you each card for no longer than 15 seconds. After you see the card, you must together agree on one number which you believe represents the dots on the card. We will go through a practice card first and then start the nine. After each set of three cards I will try to give you feedback so you have some idea how far away your answers are from the correct answers.

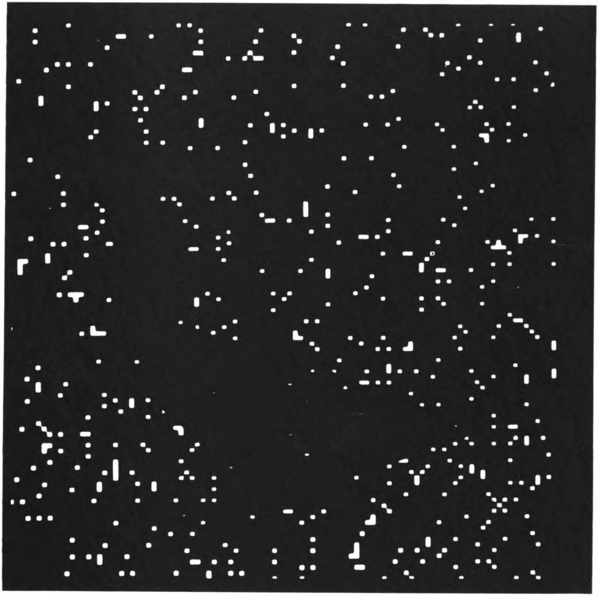
Any questions?

APPENDIX E

Sample Task Card

APPENDIX E

Sample Task Card



APPENDIX F

Subject-Receiver Instructions and Questionnaire

APPENDIX F

Subject-Receiver Instructions and Questionnaire

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF COMMUNICATION

You have been asked to come here to participate in research funded through a grant from the National Science Foundation, and designed to examine the ability of individuals, under varying conditions, to detect deception. If you choose to participate, you will be (seeing live, seeing on videotape, hearing, reading a transcript of) 3 students being questioned concerning the means by which they completed a task. Some of these students will truthfully describe the means by which they and their partner completed the task. Other students will be lying about the method used to complete the task, since at least their partner, a confederate helping us with the experiment, cheated. Your job consists of telling us whether you think the student is lying or telling the truth, and answering some additional questions concerning your decision.

We will provide anyone interested with their accuracy score. If you would like to receive your personal accuracy score, please put your name and address here:

Name: ______________________________

Address: ______________________________

____

Understand however that in a sense, if you fill out the above information your answers are no longer anonymous. However, all answers will be considered confidential and will not be seen by anyone not associated with the grant.

For each of the 3 people, you will first (see, hear, read) a segment during which they are always telling the truth. During this segment participants are asked their name, major, year in college, have they participated in research before, and the number of communication courses they are taking. Immediately following the question concerning the number of communication courses, participants will answer a series of questions concerning the solution to the task. This will be the series of questions for which the participants will either be lying or telling the truth. Based on this segment you are to decide whether the participants are lying or telling the truth. You will also be asked some additional questions concerning your decision; these will be more clearly explained as we go through the example.

The length of the segments you will judge will vary, but is unrelated to whether the person in the segment is telling the truth or lying. You will be given adequate time between each person to mark all answers, so do not worry about filling out the questionnaire while viewing; instead, pay attention to the individual being questioned.

The 3 individuals you will be seeing may all be telling the truth, all be lying, or some may be lying and others telling the truth. Please try to judge each person without regard to your previous judgments. Once you start to view the questionee, please do not talk to anyone. This request is extremely important if you are viewing the questioning live. In the case of live questioning, you will be viewing the interaction through a one-way mirror which is not soundproof. The lights will be off in the viewing room and you will have to return to this room to fill out the questionnaire. Please save any questions for the experimenter till returning to this room. Also please make all judgments independently; do not discuss them with your neighbor. Remember the first series of questions will always yield truthful responses.

NOW WE WILL EXAMINE SAMPLE QUESTIONS

Initially you will answer question 1.

1. Was the individual lying or telling the truth?

   lying __________ telling the truth ______________

2. If 0 represents no confidence in your judgment, and 10 the average amount of confidence you may have in a judgment, how confident were you in your judgment? __________

OF COURSE IN ANSWERING THIS QUESTION 10 IS NOT THE LIMIT TO HOW HIGH YOU CAN GO. IF YOU ARE MORE CONFIDENT THAN AVERAGE YOUR ESTIMATE WILL BE HIGHER THAN 10.

The third and fourth questions will be connected to the kind of information you used in making your judgment. There are three information measures in which we are interested. They are 1) NONVERBAL INFORMATION, 2) VERBAL INFORMATION, and 3) TOTAL INFORMATION.

HERE IS HOW WE WANT YOU TO GIVE US THE ABOVE INFORMATION:

We measure the amount of NONVERBAL INFORMATION used in making your decision in "NVs." An "NV" is a conceptual quantity, much as an ounce is a unit of physical quantity or weight. The greater the amount of nonverbal information present in the interview, the greater the number of "NVs" you should assign it.

NONVERBAL INFORMATION refers to the information you get from someone's NONVERBAL BEHAVIOR (facial expression, eye contact, nodding, hand and body movement, posture, pausing, the ums and ahs, anything besides their words).

We measure the amount of VERBAL INFORMATION used in reaching your decision in "V's." Like "NV's," "V's" are conceptual units, much like ounces are units of physical quantity or weight. The greater the amount of verbal information present in the interview, the greater the number of "V's" you should assign it.

VERBAL INFORMATION refers to information coming from the specific words a person says; what he says, not how he says it.

Similarly, we measure the TOTAL AMOUNT OF INFORMATION provided by a person in an interview in "TOTs"; a "TOT" is like an "NV"--it is a unit of conceptual quantity, much as an ounce is a unit of physical quantity or weight.

TOTAL INFORMATION does not have to equal the sum of VERBAL + NON-VERBAL INFORMATION. We can conceive of an instance where NONVERBAL and VERBAL INFORMATION are redundant, in which case you would only count 1 in coming up with TOTAL INFORMATION. SO FOLLOW YOUR INTUITION in making estimates and estimate each type of information without concern for the others.

We are going to provide you with a kind of ruler to do this estimation. We will show you two sample interviews and tell you how many "NVs," "Vs," and "TOTs" there are in these two. Based on this sample "RULER" you will make your estimate. It will work the same way as if I gave you two pieces of paper. I told you the first piece was six inches long and the second piece was three inches long. Based on this information, I would ask you to estimate the length of the third piece of paper.

Here are your two sample interviews. WATCH THE TV SCREEN.

SAMPLE 1 contains 100 "NVs," 50 "Vs," and 150 "TOTs."

LOOK AT SAMPLE 1 AGAIN.

SAMPLE 2 has 200 "NVs," 100 "Vs," and 300 "TOTs." NOW LOOK AT SAMPLE 2. These samples will be available to you for replaying on request and will be played before viewing each participant. You make your estimates in answer to the following questions.

3. If SAMPLE 1 has 100 "NVs" and SAMPLE 2 200 "NVs," how many "NVs" did you use in making your judgment? __________

4. If SAMPLE 1 has 50 "Vs," and SAMPLE 2 has 100 "Vs," how many "Vs" did you use in making your judgment? __________

5. If SAMPLE 1 has 150 "TOTs" and SAMPLE 2 300 "TOTs," how may "TOTs" did you use in making your judgment? __________

You may feel uncomfortable with this procedure at first. Relax. We are interested in your estimates. There are no right or wrong answers, nor do all your answers have to agree with other people's or each other's. Your estimates can be as low as 0 and as high as you wish. Do not consider the sample ruler as boundaries.

Finally, we will ask you if you can list any specific behaviors that caused you to make the judgment you did.

6. List anything you can remember about the interview which caused you to make the judgment you did.

NOW WE WILL DO A DRY RUN USING AN INTERVIEW ON THE VIDEOTAPE MONITOR. HERE ARE THE TWO SAMPLE SEGMENTS AGAIN. REMEMBER:

SAMPLE 1	SAMPLE 2
NVs = 100	NVs = 200
Vs = 50	Vs = 100
TOTs = 150	TOTs = 300

HERE IS THE TRUTHFUL SEGMENT.

HERE IS THE SEGMENT YOU JUDGE.

1. Was the individual lying or telling the truth?

   lying __________________ telling the truth ______________

2. If 0 represents no confidence in your judgment, and 10 the average amount of confidence you may have in a judgment, how confident were you in your judgment?

   ____

3. If SAMPLE 1 has 100 NVs and SAMPLE 2 200 NVs, how many NVs did you use in making your judgment?

   ____

4. If SAMPLE 1 has 50 Vs and SAMPLE 2 has 100 Vs, how many Vs did you use in making your judgment?

   ____

5. If SAMPLE 1 has 150 TOTs and SAMPLE 2 300 TOTs, how many TOTs did you use in making your judgment?

   ____

6. List anything you can remember about the interview which caused you to make the judgment you did.

NOW, if there are no questions, the questionnaire for the first person begins below the solid line.

---

	columns
1. Project Number: 0476	1-4 ___ ___ ___ ___
2. Subject Number: ____	5-7 ___ ___ ___ ___
3. Sex of Viewer: (0)male ____ (1)female ___	8 ___

columns

4. Condition: (1) live___ (2) video ___ (3) audio ___ (4) transcript ___ — 9 ___

5. Group: 1___ 2___ 3___ 4___ — 10 ___

6. Participants being viewed: ____ ____ ____ — 11-16 _ _ _ _ _ _

7. First participant viewed: _______ — 17-18 ___ ___

8. Sex of participant: (0)male (1)female — 19 __

9. Was the individual lying or telling the truth? — 20 __

lying ____________ telling the truth ________

---

right (1) wrong (0) FOR CODER USE ONLY __

---

10. If 0 represents no confidence in your judgment, and 10 represents the average amount of confidence you may have in a judgment, how confident were you of this judgment? — 21-24 __ __ __ __

____

11. If SAMPLE 1 has 100 "NVs" and SAMPLE 2 has 200 "NVs," how many "NVs" did you use in making your judgment? — 25-28 __ __ __ __

____

12. If SAMPLE 1 has 50 "Vs" and SAMPLE 2 has 100 "Vs," how many "Vs" did you use in making your judgment? — 29-32 __ __ __ __

13. If SAMPLE 1 has 150 "TOTs" and SAMPLE 2 has 300 "TOTS," how many "TOTs" did you use in making your judgment? — 33-36 __ __ __ __

columns

14. List anything you can remember about the interview which caused you to make the judgment you did.

37-38

15. Second participant viewed: _____ ___ ___

16. Sex of participant: (0)male (1)female

39

___

40

17. Was the individual lying or telling the truth?

lying _____ telling the truth _____ ___

right (1) wrong (0) FOR CODER USE ONLY

18. If 0 represents no confidence in your judgment and 10 represents the average amount of confidence you have in a judgment, how confident were you of this judgment?

41-44

_______________ ___ ___ ___ ___

45-48

19. If SAMPLE 1 has 100 "NVs" and SAMPLE 2 has 200 "NVs," how many "NVs" did you use in making your judgment?

_______________ ___ ___ ___ ___

49-52

20 If SAMPLE 1 has 50 "Vs" and SAMPLE 2 has 100 "Vs," how many "Vs" did you use in making your judgment?

_______________ ___ ___ ___ ___

53-56

21. If SAMPLE 1 has 150 "TOTs" and SAMPLE 2 has 300 "TOTs," how many "TOTs" did you use in making your judgment?

_______________ ___ ___ ___ ___

22. List anything you can remember about the interview which caused you to make the judgment you did.

columns

23. Third participant viewed: _____ 57-58 __ __

24. Sex of participant: (0)male (1)female 59 __

25. Was the individual lying or telling the truth?

lying ____________ telling the truth _______ 60

---

right (1) wrong (0) FOR CODER USE ONLY __

---

26. If 0 represents no confidence in your judgment, and 10 represents the average amount of confidence you may have in a judgment, how confident were you of this judgment? 61-64 __ __ __ __

____

27. If SAMPLE 1 has 100 "NVs" and SAMPLE 2 has 200 "NVs," how many "NVs" did you use in making your judgment? 65-68 __ __ __ __

____

28. If SAMPLE 1 has 50 "Vs" and SAMPLE 2 has 100 "Vs," how many "Vs" did you use in making your judgment? 69-72 __ __ __ __

____

29. If SAMPLE 1 has 150 "TOTs" and SAMPLE 2 has 300 "TOTs," how many "TOTs" did you use in making your judgment? 73-76 __ __ __ __

____

30. List anything you can remember about the interview which caused you to make the judgment you did.

31. Age: _____ 77-78 __ __

32. Year in school:

Freshman	(0)	_____	79
Sophomore	(1)	_____	
Junior	(3)	_____	__
Senior	(4)	_____	

- -

_______________________ has participated in ____ hours of research for me.

Joyce Bauchner

APPENDIX G

Transcripts

APPENDIX G

Transcripts

MICHIGAN STATE UNIVERSITY

PERSON 1

INTERVIEWER: State your name.*

PARTICIPANT:

INTERVIEWER: And your year in school.

PARTICIPANT: Freshman

INTERVIEWER: And your major.

PARTICIPANT: No pref.

INTERVIEWER: No pref.
Have you ever been in research before?

PARTICIPANT: No.

INTERVIEWER: How many communication courses have you taken?

PARTICIPANT: This one, I am enrolled in now.

INTERVIEWER: What's that?

PARTICIPANT: Communication 100.

INTERVIEWER: O.K.
Could you describe the strategy your group used to get their answer? Any strategy.

PARTICIPANT: Just estimating by counting the number in one certain amount.

INTERVIEWER: Could you be more specific about how you did it at all. If you're not sure how she (partner) did it, at least how you did it, some kind of . . . .

PARTICIPANT: I just estimated from the first picture you showed us.

INTERVIEWER: And what kind of conferring did you do?

PARTICIPANT: Compromise.

INTERVIEWER: O.K. If you had to describe to the next group that was going to come in what they should do to do as well as you did, in one or two sentences what would you tell them to do?

---

*All responses to this question have been removed to protect the interests of participants.

page 2 - Person 1

PARTICIPANT: Guess high.

INTERVIEWER: Alright. If you could choose to work in any one of the four size groups I talked about, alone, with one other person, with two other people, with three other people, which one would you choose?

PARTICIPANT: Two people.

INTERVIEWER: How come?

PARTICIPANT: Because three people, they never agree on anything. And with the two people you just end up compromising between the two.

INTERVIEWER: Alright. Is there anything else that you can remember about how the group got the scores they got, especially at the end when you did better.

PARTICIPANT: I found we were doing the same as we did at the beginning, but guessing higher.

INTERVIEWER: O.K. That's it.

MICHIGAN STATE UNIVERSITY

Transcript - Bauchner

PERSON 2

INTERVIEWER: Could you state your name?

PARTICIPANT:

INTERVIEWER: And your year in school.

PARTICIPANT: Freshman.

INTERVIEWER: And your major.

PARTICIPANT: Forestry.

INTERVIEWER: Forestry.
Alright. Have you ever been in research before?

PARTICIPANT: Yes. I did . . . I worked with a girl in education class. We were video taped and then we watched outselves on video tape and we commented on our behavior and stuff.

INTERVIEWER: O.K. Then you are used to being on video tape.

PARTICIPANT: It was weird.

INTERVIEWER: How many communication courses have you taken?

PARTICIPANT: My first.

INTERVIEWER: Your first. And what course is that?

PARTICIPANT: 100

INTERVIEWER: O.K. Alright.
Could you describe the strategy that your group used to get their answers?

PARTICIPANT: We took a corner, like a 1/4 or 1/8, and counted it, and then multiplied it by 4 or 8, and then like if there was a big whole we subtracted, and if it looked like we missed the big corner we added a little.

INTERVIEWER: Could you be specific, especially at the end, you started to do really well. Did you change the strategy at all?

PARTICIPANT: We compared them with how the other ones looked. You know like if we guessed really high or guessed really low, we could kinda tell if there were more dots and less dots or if they were bigger or smaller.

INTERVIEWER: O.K. If you had to describe how you did when you did well, alright, to the next group that was going to come in, tell me how you would describe it in a couple of short sentences.

page 2 - Person 2

PARTICIPANT: I'd look at the size of the dots and how far apart they were, any big spaces, and I'd divide it into 1/4 and 1/8's and I think I'd keep a running total of like if one looked particularly alot of dots, and I'd remember which sections had more and which sections had less and just add them all together.

INTERVIEWER: O.K. If you could choose which size group you would work in, alone or with two people or three or four, which would you choose?

PARTICIPANT: Two.

INTERVIEWER: What kind of benefits did you think you got from working in this size group?

PARTICIPANT: Well, you can count that much faster. Plus I like your own judgment your not too sure about sometimes it just looks like more or looks like less. If you had three, there'd be too many. You couldn't all decide. But with two there would be two people to share and you could.

INTERVIEWER: Is there any way else that you could describe what you do that you did, in more detail? Especially when you felt you were doing well.

PARTICIPANT: Just I think comparing it to previous dots and like if you guessed a number it just sounded like there were too many or too few.

INTERVIEWER: O.K. Thank you very much.

MICHIGAN STATE UNIVERSITY

Transcript - Bauchner

PERSON 3

INTERVIEWER: State your name.

PARTICIPANT:

INTERVIEWER: Year in school.

PARTICIPANT: Yes.

INTERVIEWER: Year in school.

PARTICIPANT: Not now.

INTERVIEWER: Year in school.

PARTICIPANT: Oh, year in school. Freshman.

INTERVIEWER: O.K. Major?

PARTICIPANT: No pref.

INTERVIEWER: No pref.
Have you ever been in research before?

PARTICIPANT: No.

INTERVIEWER: O.K.
How many Com courses have you taken?

PARTICIPANT: My first one. And I'd taken it in high school, public speaking class.

INTERVIEWER: And this is....

PARTICIPANT: 100

INTERVIEWER: O.K. Could you describe the strategy your group used to get the answers that they got?

PARTICIPANT: Sure. Mostly estimation. Guessing.

INTERVIEWER: Be more specific.

PARTICIPANT: O.K. I took a, I compared it to other pictures like the first practice one we had, and if there were less dots then I'd bring it down a couple hundred or so. And then I'd converse with her, figure out what she had, a kinda divided in half and agree on that.

INTERVIEWER: O.K. Could you be more specific by which you mean when you say converse?

PARTICIPANT: We made our decision on one number and then that number, if we agree on it, that was what we got.

page 2 - Person 3

INTERVIEWER: O.K. If you had to describe to the next group, that was going to come in, what they should do to do as well as you did, in two or three sentences, what would you tell them? You know what are, boil down to the secret to your success?

PARTICIPANT: Secret to our success. I think its totally guess. I wouldn't even know how to explain to another person how to do it better. Unless, maybe they could count faster.

INTERVIEWER: If you could choose any of the size groups we talked about to work in, to work alone, or with one other person like we did now, or two other or three other people which would you like to work in?

PARTICIPANT: Maybe four people.

INTERVIEWER: How come?

PARTICIPANT: Split it into quarters. It would be faster.

INTERVIEWER: O.K.
Is there anything else you could describe how you did it? You know, how you did so well. Basically, when you did well, what did you attribute that to?

PARTICIPANT: Looking at the pictures. Comparing the pictures. Like if there were alot of dots in one of, one of them, I'd go by that. That's all I can tell you.

INTERVIEWER: O.K.

MICHIGAN STATE UNIVERSITY

Transcript - Bauchner

PERSON 4

INTERVIEWER: Could you state your name?

PARTICIPANT: You want my name?

INTERVIEWER: Yes.

PARTICIPANT: It's

INTERVIEWER: O.K.

PARTICIAPNT: G-E-N-E. After my mother.

INTERVIEWER: O.K. Year in school?

PARTICIPANT: Yes mame.

INTERVIEWER: Year in school.

PARTICIPANT: Oh, year in school. I come from the country see, . . . you're in school . . . O.K.

INTERVIEWER: That's the second time this has happened. That's alright!

PARTICIPANT: O.K. Year in school is a freshman.

INTERVIEWER: O.K. Major?
It's my accent.

PARTICIPANT: O.K. New York?

INTERVIEWER: New Jersey.

PARTICIPANT: Oh, New Jersey. O.K. My major is journalism presently.

INTERVIEWER: O.K.
Have you ever been in research before?

PARTICIPANT: No mame.

INTERVIEWER: O.K.

PARTICIPANT: Well, I, they had a questionnaire, my ATL prof sent a lady out this winter asking me some questions.

INTERVIEWER: O.K.
But like this before?

PARTICIPANT: No mame.

INTERVIEWER: O.K.
Home many Com courses have you had?

PARTICIPANT: My first.

2 - Person 4

INTERVIEWER: Which is?

PARTICIPANT: Com 100

INTERVIEWER: O.K.

PARTICIPANT: Keith Adler

INTERVIEWER: Keith Adler. O.K.
Alright now, could you describe the kind of strategy, as you went along, that your group used in solving the task?

PARTICIPANT: Mine was hunt and peck. In all truth it was.

INTERVIEWER: Could you be more specific?

PARTICIPANT: Well, what I did first of all is I looked. I had no, I'm very mechanically inapt. So, I looked, down the page as best I could and determined well, gee whiz, what is this, and I just came up with a number. And the dear lady here, straightened me out. And that's all there was. And in truth, in the first part as it progressed. . . Do you want the whole thing?

INTERVIEWER: Yes.

PARTICIPANT: O.K. Well as it went along and, then 3rd or 4th or whatever it was, I started to count. I counted like in the top line, I counted 10, as I said in there. And then I tried to proportion that as in terms of the page, and then I also tried to take in account up here that some of the page was sparse in terms of dots, with larger dots with L-shaped. And then down it was more concentrated and I tried to take that into account.
And then we debated.

INTERVIEWER: O.K. If you had, if you had to, if I was to let you talk to the next group that was coming in, and I told you in two or three sentences to describe, you wanted to describe to them how to do well. What would you tell them?

PARTICIPANT: I would say, do as we did. Communicate, and don't be hurried about the time. Try to make up a system. Try to be in groups or make, and count and then try to proportion in groups. But the main thing would be, communicate. And listen to the other person, and don't rely on yourself too much.

INTERVIEWER: O.K. If you had to choose, now, if you could do it again and you could choose what size group to work in whether it's one, two, three or four man, What size would you choose?

PARTICIPANT: Two.

INTERVIEWER: Why?

PARTICIPANT: Because if you get three, if you get one your going to have, at least I would anyway, have many, many self doubts. I'm sure. In there, there were numbers that I threw out that were hundreds off and my partner here straightened me out. And with three you would have three divergent opinions, probably. And it would seem to me, anyway, you would argue more than you should. And you would just get frustrated, it would seem to me. And you would just come up with a wild number that perhaps wouldn't be. . .

INTERVIEWER: O.K. One more question. O.K. And it's simply is there anything else that you want to do to describe, anything I could have left out, or you could have left out in your description?

PARTICIPANT: My description.

INTERVIEWER: Your description of what, your strategy of how you

PARTICIPANT: No.

INTERVIEWER: O.K.

MICHIGAN STATE UNIVERSITY

Transcript - Bauchner

PERSON 5

INTERVIEWER: State your name.

PARTICIPANT:

INTERVIEWER: Alright.
What year are you in school?

PARTICIPANT: This is my first year.

INTERVIEWER: O.K. I keep on saying year in school and people go "yes." Major?

PARTICIPANT: Major is pre-med.

INTERVIEWER: High aspirations. Good luck!

PARTICIPANT: Yeah well, thank you.

INTERVIEWER: Have you ever been in research before?

PARTICIPANT: No I haven't.

INTERVIEWER: O.K. How many Com courses have you taken?

PARTICIPANT: This is my first.

INTERVIEWER: And this is. . .

PARTICIPANT: This is 100.

INTERVIEWER: O.K. Alright now . . . Could you describe as best as you can, the kinds of strategies that your group went through, to get their answers.

PARTICIPANT: For this experiment?

INTERVIEWER: That's right.

PARTICIPANT: Well . . . It took a couple tests before we realized that we were very much different in our answers. But, mainly we tried to, our big trouble was trying to compare all the pictures. Cuz when you see all these dots, sometimes, you're mainly trying to compare the different ones and you're trying to figure out in segments, like in groups of ten. Then we always added a few more cuz we did count so hard. That was our main strategy, though.

INTERVIEWER: O.K. Could you be more specific how it changed as it went along? Like you know, like what kind of changes in strategy you think you had at the end. You did really well.

PARTICIPANT: Well in the beginning we were mainly just trying to count them. . . one, two, three, four, five. And we thought we didn't have time. So as it went along we were mostly compromising, because Sandra was always alot higher. And I was mostly lower. And we were sort of trying to compare them more often.

INTERVIEWER: O.K.

PARTICIPANT: Trying to come up and be more reasonable with each other.

INTERVIEWER: If you. If I. . . there's another group that is going to come in soon, if I say, O.K. I want you to go out and I want you to describe in two or three sentences, to that group, how to do as well, what would you tell them to do as well as you did?

PARTICIPANT: What would I tell them?

INTERVIEWER: What would you tell them?

PARTICIPANT: I would tell them not to worry too much about counting them, just to get, to keep a basic in mind. How many the comparison, . . . mostly to compare them, and to keep in mind what each thing looked like. And tell them that there is a pat . . . no I won't tell them there's a pattern. Just tell them, mostly that, estimate higher than what they come up with. I mean,

INTERVIEWER: O.K. Alright now . . . remember I told you that there was groups of one, two, three and four that were doing this. If you would choose to do it again, let's say I told you this was a test run, now you get to choose what size group to work in, what size group do you think you'd pick?

PARTICIPANT: I think I'd pick three.

INTERVIEWER: Why?

PARTICIPANT: Well, I knew that if I'd do it by myself it would have been really. And I knew like when Sandra and I were doing it we still had major difficulties. If we had a third person there, they would be closer to one of the other two, which they could take their answers jointly and figure out their estimations on how many dots there were.

INTERVIEWER: O.K. That's fine.
Alright that's it.

MICHIGAN STATE UNIVERSITY

Transcript - Baucher

PERSON 6

INTERVIEWER: State your name.

PARTICIPANT:

INTERVIEWER: O.K. What year in school are you?

PARTICIPANT: Freshman.

INTERVIEWER: Major?

PARTICIPANT: Forestry.

INTERVIEWER: Forestry. Have you ever been in research before?

PARTICIPANT: No.

INTERVIEWER: None.

PARTICIPANT: None.

INTERVIEWER: How many Com courses have you taken?

PARTICIPANT: One Com, but I've taken an advertising course that counts as Communication in my major.

INTERVIEWER: O.K. Can you describe the kind of strategy in which your group used to get your answers.

PARTICIPANT: What kind of strategy?

INTERVIEWER: A huh.

PARTICIPANT: Just group the dots in groups of ten, and then count across, and then multiply that by ten.

INTERVIEWER: Is that what you did the whole time?

PARTICIPANT: That's what I did the whole time.

INTERVIEWER: Is there any kind of strategy between you two that you used to come up with one number?

PARTICIPANT: Yeah. We usually raised it up a little.

INTERVIEWER: O.K. If you had to describe like in two or three sentences to the next group that is going to come in, how to do as well as you did, let's say that was the question, what would you tell them to do?

PARTICIPANT: There's more numbers there than you think there are.

INTERVIEWER: Alright, if you could choose the size group you would work in, let's decide you were to do this again. Which would you choose, one, two, three, or four-man group?

PARTICIPANT: Probably, three.

INTERVIEWER: Why?

PARTICIPANT: Four I guess you would come up with too many conflicts. Two we, one would never have done it cuz it takes more than one person cuz somebody could underestimate. Three just seems like one person might say, well it seems like a little more. And two people might come up with, you know, not the, a little lower or something.

INTERVIEWER: Is there anything else about the strategy, we're particularly interested about the way you went about getting your answers, that you think. . .
Can you differentiate when you did well and when you didn't do well?

PARTICIPANT: Could you repeat that?

INTERVIEWER: Just is there anything more about the strategies, you know like you think of the different kinds of strategies that were used when you did well and didn't do well?

PARTICIPANT: Well, just like, when we got shown, when we had small dots, there are a heck of a lot more. They can put a lot more on those papers with small dots. And you've just got to think big with those. You can do the groups of ten a lot easier with the big dots than you can with the small dots. We should of added a lot more to the small dots.

MICHIGAN STATE UNIVERSITY

Transcript - Bauchner

PERSON 7

INTERVIEWER: Could you state your name?

PARTICIPANT:

INTERVIEWER: Year in school?

PARTICIPANT: Freshman.

INTERVIEWER: And your major?

PARTICIPANT: General Business.

INTERVIEWER: Have you ever been in research before?

PARTICIPANT: No.

INTERVIEWER: None?

PARTICIPANT: No. No I haven't.

INTERVIEWER: How many communication courses have you taken?

PARTICIPANT: Zero.

INTERVIEWER: Zero. Are you taking one now?

PARTICIPANT: Well, yeah, now.

INTERVIEWER: That's the only one?

PARTICIPANT: Right.

INTERVIEWER: O.K. Could you describe the kind of strategy that your group used to get your answers?

PARTICIPANT: We used . . .

INTERVIEWER: I'm asking you now, then I'll ask her.

PARTICIPANT: Oh. We used a lot of them, that's for sure. How will I say it, let's see. But, her strategy was right, I'll admit that.

INTERVIEWER: How would you describe it? What was her strategy?

PARTICIPANT: Well, we just figured there was 10, we had to figure out from the ten cards. Then we said that, somehow like we started with, I think it was like four numbers, and each one of those was like first, the practice one was 1000, then the next one was like 200, and the next one was like 200. So we said that there's maybe going to be like two of each number, cuz like the fourth one looks like 300, and we thought the number would start keep going higher and higher, you know like the next one would be 300, no the next one would be like 400. But it wasn't. that wasn't

(cont'd.)

PARTICIPANT: true. But, the basic part of it was right. There was going to be two of each number.

INTERVIEWER: Is there anything else that you, any other procedure that you went through besides?

PARTICIPANT: Well, then we tried to measure it, you know, measure the card, and measure the area across, of how much was in each area, and that got to be too complicated. Then we tried, then each of us, you know, just would count like half of it, half of each side and we figure the discrepancy between the two.

INTERVIEWER: What strategy were you following when you found that you were really doing well?

PARTICIPANT: I think the best way was to figure which half, count our half and then discuss it from there.

INTERVIEWER: O.K. If you had to describe, let's say I want you to talk to the next group that was coming in, and I wanted you in two or three sentences, I was going to let you talk to them for a couple of minutes, and you would have to tell them how you do as well, what they would have to do to do as well as you did, what would you tell them?

PARTICIPANT: We did well?

INTERVIEWER: Yeah. But go ahead, I want to know how you would tell them. In one or two sentences what they would have to do to do as well as you did.

PARTICIPANT: I'd say, each of you count half the side, then just discuss it from there, how many you think was on each side. And count the total up.

INTERVIEWER: If you had to do this again, and I let you choose what size group you'd be in, one, two, three or four, what size group would you choose?

PARTICIPANT: One.

INTERVIEWER: Why?

PARTICIPANT: It might be because of my personality, and I think it might be because, I think it would work out better, too.

INTERVIEWER: O.K. Is there anything else that you could think of about the strategy that you used, that you haven't told me yet, that helped you in your answers?

PARTICIPANT: No.

MICHIGAN STATE UNIVERSITY

Transcript - Bauchner

PERSON 8

INTERVIEWER: State your name.

PARTICIPANT:

INTERVIEWER: O.K.
And your year in school?

PARTICIPANT: Freshman.

INTERVIEWER: Major?

PARTICIPANT: No pref.

INTERVIEWER: No pref.
Alright, have you ever been in research before?

PARTICIPANT: Psychology experiments.

INTERVIEWER: Like this?

PARTICIPANT: Not like this.

INTERVIEWER: O.K.
How many communication courses have you had?

PARTICIPANT: My first one.

INTERVIEWER: First one. O.K.
Could you describe the strategy that your group used?

PARTICIPANT: Random. We tried to count them and then organize space, I guess. How many dots we thought were in the spaces.

INTERVIEWER: Could you be more specific? Did it change as you went along? Did it stay the same?

PARTICIPANT: Sort of took a small spot and tried an count the dots in the spot and then tried and figured how many spots there were like that and how many dots we found. Kinda of random there.

INTERVIEWER: How did you interact between you. Were there any new strategies between you?

PARTICIPANT: I don't know . . . I think we just kinda guessed.

INTERVIEWER: O.K. If you had to describe, if I let you walk out, and I said I want you to go to the next group and tell them in two or three sentences what they have to do to do as well as you did, what would you tell them?

PARTICIPANT: Think fast. Don't underestimate, probably.

INTERVIEWER: O.K.
If you could choose, I told you there were four size groups that were going to be this, if you could choose the size that you are going to work in, one, two, three, or four, what size would you choose?

PARTICIPANT: Probably a smaller group.

INTERVIEWER: Could you be more specific?

PARTICIPANT: I have to pick one, right?

INTERVIEWER: Right.
We'd like you to pick one.

PARTICIPANT: This is after you've done it once?

INTERVIEWER: Right. And now we said this didn't count, and you get to do it again, but this time you get to do it and pick what size.

PARTICIPANT: I'd probably go myself.

INTERVIEWER: Why?

PARTICIPANT: I don't know, I just . . . with more people it's harder to figure out, you know the different opinions.

INTERVIEWER: Is there anything else that you haven't told me that would help describe the kinds of decision-making processes you went through, you know, especially when you did well? Because that's what we are interested in.

PARTICIPANT: I guess, I don't know. Just try to figure out the space. Some pictures look like they've got a lot of space and some had a little.

INTERVIEWER: O.K.

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Transcript - Bauchner

PERSON 9

INTERVIEWER: Could you state your name?

PARTICIPANT:

INTERVIEWER: And the year you are in school.

PARTICIPANT: Freshman.

INTERVIEWER: O.K. Major?

PARTICIPANT: No pref.

INTERVIEWER: Have you ever done any research before?

PARTICIPANT: No.

INTERVIEWER: None. Whatsoever?

PARTICIPANT: No.

INTERVIEWER: O.K. You've had to count dots before, huh?

PARTICIPANT: No, not really,

INTERVIEWER: How many communication courses have you taken?

PARTICIPANT: This is the only one. Only one.

INTERVIEWER: O.K.
Can you describe the kind of strategies your group used to get the answers?

PARTICIPANT: Well, we had to figure out something where we could utilize two people so that . . .

INTERVIEWER: How did you do that?

PARTICIPANT: Like taking certain areas and each one of us counting, and then taking the average of what we counted.

INTERVIEWER: O.K. Any more specifically how it changed as you went along?

PARTICIPANT: Well our, we found out that at the end, like at the beginning we were each taking halfs and counted them, when there were less dots, but more dots we'd take a little space, count them, and each one of us would count all the spaces, then we'd take what the average of those.

INTERVIEWER: O.K. If I told you there's another group waiting in the waiting room and that you could talk to them, in two or three sentences, tell them what they'd have to do to do as well as you did, what would you tell them?

PARTICIPANT: They wouldn't want to do as well as we did. I don't know. Just to, you know, try and make two people count their own thing and then average the two decisions.

INTERVIEWER: Alright. If I told you that this time didn't count, and that now you've got a chance to do the thing again, in any size group you wanted to do, one, two, three, four, what size would you take?

PARTICIPANT: Four. Definitely!

INTERVIEWER: How come?

PARTICIPANT: Cuz I think you'd get the closest estimate. Like what a lot of people see.

INTERVIEWER: O.K.
Anything else you can tell me about the kind of strategy you used, especially when you were doing well at the end?

PARTICIPANT: Not really. You could take it a little easier at the beginning just by counting all the dots. We realized that we were under counting everything, so you know, that kinda made a difference in what we were saying. That's about it.

INTERVIEWER: O.K.

MICHIGAN STATE UNIVERSITY

Transcript - Bauchner

PERSON 10

INTERVIEWER: Could you state your name?

PARTICIPANT:

INTERVIEWER: What year in school are you?

PARTICIPANT: Freshman at Michigan State University.

INTERVIEWER: What's your major?

PARTICIPANT: Packaging/management.

INTERVIEWER: Have you ever been in on research before?

PARTICIPANT: No.

INTERVIEWER: Nothing.

PARTICIPANT: Zero.

INTERVIEWER: O.K. What kind of communication, how many communication courses have you taken?

PARTICIPANT: Well, this is my second time around in Com 100. I dropped out last time cuz I didn't like the professor.

INTERVIEWER: Oh. O.K. We won't ask you who the professor was.

PARTICIPANT: O.K.

INTERVIEWER: Could you describe the strategies that you thought your group was using as you went through the task and tried to figure out.

PARTICIPANT: It was pretty inadvertent. I suppose, I just guessed. Well I guessed within a range of what would be the possible answers.

INTERVIEWER: I mean why did you guess what you guessed?

PARTICIPANT: If the dots were fairly dense, I'd say between 500 and 1,000, that the dots . . . I didn't really guess. It was guessing in the range that was in my mind, you know.

INTERVIEWER: Could you, can you give me any idea of what kind of process...

PARTICIPANT: If the dots were really dense, I'd pick a wide range where the dots could be and I'd just close in a number of the dot that came to my head and I'd pick the number.

INTERVIEWER: How did you interact with your partner? Was there any kind of strategy between you? What happened between you?

PARTICIPANT: Well, yeah because, if she thought I made a bad guess we'd get closer to her guess, and they were usually good cuz she helped me. But she was definitely doing better at the end.

INTERVIEWER: O.K.
If I was to let you go out and talk, there's yet another two people waiting to come in, I told you there was another dyad, and I asked you to describe in two or three sentences to them what they have to do to do as well as you did, what would you tell them? I'd say you can tell them two or three things.

PARTICIPANT: Tell them. I wouldn't tell them anything, because it's just guessing. That's all.

INTERVIEWER: I also told you there were groups of one, two, three and four, and you were in a group of two. If I told that this time around didn't count, and you could do it again, you're going to do it again tonite, and you could choose what size group having gone through it once, you wanted to be in for the time it counted, what size group would you choose?

PARTICIPANT: Four.

INTERVIEWER: Why?

PARTICIPANT: More opinions, but not so many that there were would be confusion. If you only have a certain amount of time to look at the cards, four people would be a good amount to work with in anything.

INTERVIEWER: Oh, alright. Is there anything else about your strategy that you can think of that would describe how your group worked, that you felt helped you do well?

PARTICIPANT: I might have done better if the situation was more crucial. Like if you wouldn't let me out of here in the next five years, unless I got within 10 of every one, I might have thought much harder.

INTERVIEWER: O.K.

PARTICIPANT: Or if the offer was for $500.

INTERVIEWER: $500?

MICHIGAN STATE UNIVERSITY

Transcript - Bauchner

PERSON 11

INTERVIEWER: Could you state your name?

PARTICIPANT: My name?
My whole name is

INTERVIEWER: O.K.
And year in school?

PARTICIPANT: Right.

INTERVIEWER: Your year in school.

PARTICIPANT: Huh?

INTERVIEWER: What year in school?

PARTICIPANT: What year? Junior.

INTERVIEWER: O.K. Speak louder so the mike can pick you up. O.K. Your major?

PARTICIPANT: Communications

INTERVIEWER: O.K.
Have you ever been in research before?

PARTICIPANT: Yes. I have.

INTERVIEWER: Like this?

PARTICIPANT: No. Nothing like this. The kind of research was, I did it up at Northern two years ago, it was for a kind of a random sampling of a presidential election, something like that.

INTERVIEWER: O.K.
How many communication courses have you had?

PARTICIPANT: Two.

INTERVIEWER: What . . .

PARTICIPANT: Business Communications and one other one, writing reports, something like that, it was a business report class.

INTERVIEWER: O.K. And this one.

PARTICIPANT: Ah huh.

INTERVIEWER: O.K.
Alright. Describe the kind of strategies that your group was using to get their answers.

PARTICIPANT: Well, we did it this way . . . my type of strategy, first of all, was to count the number of dots going horizontally and that way I could determine that score vertically, cuz they're just about the same. It was one square. The square was about the same proportion, the vertical and the horizontal were just about the same proportion. So, what we did, what I did was multiply what I counted horizontally four times cuz there are four sides to a square and we counted down, it's hard to explain.

INTERVIEWER: Go ahead, just describe.

PARTICIPANT: I counted them horizontally and whatever number I came up with, multiply that by four. O.K. And we came really close. I don't know how, but we seemed to do alright cuz we were close to most of the answers.

INTERVIEWER: How did you interact as a group? You said that was your strategy. What did you do, I know you had to come up with one number. What did Sandra do?

PARTICIPANT: Well, we were supposed to, we originally, we didn't do it until later on. I was supposed to count horizontally and she was supposed to count vertically. So we wouldn't both be counting the same ones and waste time, you know. While she could be doing something else, that way we could come up with an answer.

INTERVIEWER: O.K.
If I was to take you out into the other room and there's another group waiting to go in and I said O.K. I want you to tell, in two or three sentences, how to do as well as you did, what would you tell them?

PARTICIPANT: What strategy to use? The best strategy?

INTERVIEWER: Yeah, you have to describe in two or three sentences what to tell them to do as well as you did.

PARTICIPANT: O.K. I'd tell them instead of trying to count all the dots, cuz you only have 15 seconds, there's no way, you've got to start at the surface of the square, you know and kinda figure, by looking at the number of dots if there's a big open space in the middle, you subtract 100 dots or whatever, so what you start out by doing is counting the outside part of the square and that way, by doing that you kind of have an idea. Oh, it's hard to explain. I can't say it in words. I know what I'm talking about, but I can't say it in words.

INTERVIEWER: If I told you there were individuals doing this alone, or groups of two, like you, or threes, or fours, if I told you that what you just did didn't count and you got a chance to

INTERVIEWER: do it again and you could pick what size group you would do it with, what size group would you pick?

PARTICIPANT: I would pick two. Because if you have a whole bunch of people, or maybe that's better, if you have a whole bunch of people cuz that way everybody can try out a different strategy and get all mixed up. Everybody would have different numbers and everything. If you just have one person, another person that can help you, you know, I think that's better or if I do it by myself, I think it would be harder. You're doing it by yourself, you don't have somebody else helping you. So I think two people is best.

INTERVIEWER: O.K.
Is there anything else that you can think of, any other ways to describe what you did especially when you really did well?

PARTICIPANT: Other ways to describe it?

INTERVIEWER: Yes. Anything you can think of that you left out? I'm just checking back. Youknow, anything that you felt helped you do really well?

PARTICIPANT: Help me do well? I guess it was I had some motivation because you mentioned I was competing. Whenever I'm competing, I get under pressure. I know every time I'm under pressure, I do well cuz the past experiences when I'm under pressure I do well.

INTERVIEWER: O.K.

MICHIGAN STATE UNIVERSITY

Transcript - Bauchner

PERSON 12

INTERVIEWER: State your name?

PARTICIPANT:

INTERVIEWER: Your major?

PARTICIPANT: No pref.

INTERVIEWER: Year in school?

PARTICIPANT: Freshman.

INTERVIEWER: O.K.
And, have you ever been in research before?

PARTICIPANT: No.

INTERVIEWER: Not at all?

PARTICIPANT: No.

INTERVIEWER: How many communication courses have you taken?

PARTICIPANT: This is my first one.

INTERVIEWER: That is. . . .

PARTICIPANT: Com 100.

INTERVIEWER: O.K.
Now, I want you to describe for me the kind of strategy that your group used in order to come up with the numbers that you gave me.

PARTICIPANT: Well, by myself or both of us?

INTERVIEWER: Your perception of what you as a group used.

PARTICIPANT: Well, I counted dots that looked like were grouped together and then I counted over in the square, like how many groups of those dots I thought there would be and then I counted down and multiplied those, and I don't know what she did, but then we put together, compromised and come up with an answer.

INTERVIEWER: O.K.
Did it change at all as you went along? Did it change as time went on or did you use the same thing every time?

PARTICIPANT: Well after we started getting feedback we tried to, we realized that we were under cutting it, so we tried to make our numbers higher.

INTERVIEWER: O.K.
Now, if there is another group out there, alright, and I said O.K. I want you to go to tell them in two or three sentences what they should do to do as well as you did, what would you tell them?

PARTICIPANT: I don't know.
Don't get nervous, I suppose and just try your best. I don't know.

INTERVIEWER: O.K.
Now also, let's say that I just told you that this time didn't count, alright, you were going to go in the other room now and do it again. If you had your choice, this time, you could either work alone, or with two like your working now, or say in a group of four, which size group would you prefer?

PARTICIPANT: A group of four.

INTERVIEWER: Why?

PARTICIPANT: Cuz you'd have more answers and more to compromise, with out of 4 there's likely to be someone right.

INTERVIEWER: Is there anything else that you can think of telling me about the kind of strategy, we're interested in group strategy, that you used to come up, especially when you started to do well?

PARTICIPANT: You want me to tell you something about the strategy? I think ours was good. Use that one.

INTERVIEWER: O.K.

APPENDIX H

ANOVAs for Transformed Variables

APPENDIX H

ANOVAs for Transformed Variables

Table H1

Analysis of Variance of Available Total Information by Channel Condition Using Transformed Variables*

Source	Sum of Squares	df	MS	F	p
Total	7.637	239	--	--	--
Between	6.278	3	2.093	363.508	< 0.001
Within	1.359	236	.006	--	--

Table H2

Analysis of Variance of Available Nonverbal Information by Channel Condition Using Transformed Variables

Source	Sum of Squares	df	MS	F	p
Total	591.908	239	--	--	--
Between	590.248	3	196.749	27956.603	< 0.001
Within	1.661	236	.007	--	--

*Transformation formula is: transformed variables (variable + .05)$\log_{10}$.

Table H3

Individual Comparisons of Channel Condition Available Total Information Means Using Transformed Variables*

Channel Condition	Mean
Live	2.528_q
Videotape	2.558_r
Audiotape	2.418_s
Transcript	2.147_t

Table H4

Individual Comparisons of Channel Condition Available Nonverbal Information Means Using Transformed Variables*

Channel Condition	Mean
Live	2.364_u
Videotape	2.416_v
Audiotape	2.164_w
Transcript	-1.301_x

* Means having the different subscripts differ significantly at the .05 level of confidence.
Transformation formula is: transformed variable = (variable + .05)$\log_{10}$.

APPENDIX I

Lisrel Matrices:

Models I, II, and III

APPENDIX I

Table Il. Model I: Input Data

P = 10
Q = 3
M = 4
N = 3
NP = 240
Logical Indicators = TTTFTFT
Integer Indicators = 133
Estimated Time in Seconds = 120

SYY

	1	2	3	4	5	6	7	8	9	10
1	.087									
2	.086	.087								
3	.084	.084	.086							
4	33.042	32.451	31.167	14362.035						
5	31.940	31.752	30.318	14137.260	14915.818					
6	28.933	28.401	28.546	12195.210	12227.060	11453.395				
7	28.828	28.516	27.600	12817.516	12726.852	10898.590	11688.007			
8	26.603	25.904	25.125	12495.535	13707.146	.0971.997	11458.031	13561.597		
9	25.011	24.152	23.822	11045.788	11253.307	10513.548	9928.992	10562.465	10397.582	
10	.004	.002	.002	2.666	2.165	2.755	1.637	.951	3.159	.248

SXY

	1	2	3	4	5	6	7	8	9	10
1	.045	.050	.052	16.208	21.323	17.776	14.755	18.958	14.115	.028
2	.060	.059	.055	30.458	25.677	23.755	26.672	20.729	20.990	.003
3	.019	.014	.018	-3.646	-5.531	-2.536	-3.745	-6.021	-2.385	-.034

SXX

	1	2	3
1	.188		
2	-.063	.188	
3	-.063	-.063	.188

Table I2. Model I: Initial Solution

Lambda Y

	1	2	3	4
1	1.000	0.000	0.000	0.000
2	.950	0.000	0.000	0.000
3	.901	0.000	0.000	0.000
4	0.000	1.000	0.000	0.000
5	0.000	1.653	0.000	0.000
6	0.000	1.398	0.000	0.000
7	0.000	0.000	1.000	0.000
8	0.000	0.000	1.114	0.000
9	0.000	0.000	.965	0.000
10	0.000	0.000	0.000	1.000

Lambda X

	1	2	3
1	1.000	0.000	0.000
2	0.000	1.000	0.000
3	0.000	0.000	1.000

Beta

	1	2	3	4
1	1.000	0.000	0.000	0.000
2	0.000	1.000	0.000	0.000
3	0.000	-1.185	1.000	0.000
4	-.060	.028	.038	1.000

Gamma

	1	2	3
1	.450	.500	.510
2	.478	.542	.458
3	.489	.431	.499
4	0.000	0.000	0.000

Initial Solution (cont'd)

Phi

	1	2	3
1	.188		
2	-.063	.188	
3	-.063	-.063	.188

Psi

	1	2	3	4
1	.398			
2	-.001	2.183		
3	.067	.473	.520	
4	.056	-.061	.029	.578

Theta Eps

	1	2	3	4	5	6	7	8	9	10
1	.047	.046	.052	1.678	1.089	1.302	1.182	1.476	1.446	0.000

Theta Delta

	1	2	3
1	0.000	0.000	0.000

Table I3. Model I: Maximum Likelihood Solution

IND = 5

Lambda Y

	1	2	3	4
1	1.000	0.000	0.000	0.000
2	-2.029	0.000	0.000	0.000
3	-2.133	0.000	0.000	0.000
4	0.000	1.000	0.000	0.000
5	0.000	5.172	0.000	0.000
6	0.000	4.675	0.000	0.000
7	0.000	0.000	1.000	0.000
8	0.000	0.000	1.126	0.000
9	0.000	0.000	.859	0.000
10	0.000	0.000	0.000	1.000

Lambda X

	1	2	3
1	1.000	0.000	0.000
2	0.000	1.000	0.000
3	0.000	0.000	1.000

Beta

	1	2	3	4
1	1.000	0.000	0.000	0.000
2	0.000	1.000	0.000	0.000
3	0.000	-5.026	1.000	0.000
4	-44.617	-.574	.073	1.000

Gamma

	1	2	3
1	-1.453	-1.392	-1.788
2	46.606	55.066	30.653
3	-20.375	-17.157	-15.206
4	0.000	0.000	0.000

Maximum Likelihood Solution (cont'd)

Phi

	1	2	3
1	.188		
2	-.063	.188	
3	-.063	-.063	.188

Psi

	1	2	3	4
1	1.831			
2	1.698	45.929		
3	-16.326	25.314	-224.831	
4	2.334	-7.503	-11.171	14.998

Theta Eps

	1	2	3	4	5	6	7	8	9	10
1	.456	-.048	-.041	62.564	34.601	29.468	40.721	45.149	31.689	0.000

Theta Delta

	1	2	3
1	0.000	0.000	0.000

Chi-Square with 53 degrees of freedom is 6849.1375; Probability Level = 0.000.

Table I4. Model I: Standardized Solution

Lambda Y

	1	2	3	4
1	1.516	0.000	0.000	0.000
2	-3.076	0.000	0.000	0.000
3	-3.234	0.000	0.000	0.000
4	0.000	22.022	0.000	0.000
5	0.000	113.904	0.000	0.000
6	0.000	102.946	0.000	0.000
7	0.000	0.000	103.948	0.000
8	0.000	0.000	117.047	0.000
9	0.000	0.000	89.335	0.000
10	0.000	0.000	0.000	68.664

Lambda X

	1	2	3
1	.434	0.000	0.000
2	0.000	.434	0.000
3	0.000	0.000	.434

Beta

	1	2	3	4
1	1.000	0.000	0.000	0.000
2	0.000	1.000	0.000	0.000
3	0.000	-1.065	1.000	0.000
4	-.985	-.184	.110	1.000

Gamma

	1	2	3
1	-.416	-.398	-.511
2	.918	1.084	.604
3	-.085	-.072	-.063
4	0.000	0.000	0.000

Standardized Solution (cont'd)

Phi

	1	2	3
1	1.000		
2	-.335	1.000	
3	-.335	-.335	1.000

Psi

	1	2	3	4
1	.797			
2	.051	.095		
3	-.104	.011	-.021	
4	.022	-.005	-.002	.003

Theta Eps

	1	2	3	4	5	6	7	8	9	10
1	.456	-.048	-.041	62.564	34.601	29.468	40.721	45.149	31.689	0.000

Theta Delta

	1	2	3
1	0.000	0.000	0.000

Chi-Square with 53 degrees of freedom is 6849.1375; Probability Level = 0.000.

Table I5. Model II: Input Data

P = 7
Q = 3
M = 3
N = 3
NP = 240
Logical Indicators = TTTFTFT
Integer Indicators = 133
Estimated Time in Seconds = 00

SYY

	1	2	3	4	5	6	7
1	14632.035						
2	14137.260	14915.818					
3	12195.210	12227.060	11453.395				
4	12817.516	12726.852	10898.590	11688.007			
5	12495.535	13707.146	10971.997	11458.031	13561.597		
6	11045.788	11253.307	10513.548	9928.992	10562.465	10397.582	
7	2.666	2.165	2.755	1.637	.951	3.159	.248

SXY

	1	2	3	4	5	6	7
1	16.208	21.323	17.776	14.755	18.958	14.115	.028
2	30.458	25.677	23.755	26.672	20.729	20.990	.003
3	-3.646	-5.531	-2.536	-3.745	-6.021	-2.385	-.034

SXX

	1	2	3
1	.188		
2	-.063	.188	
3	-.063	-.063	.188

Table I6. Model II: Initial Solution

Lambda Y

	1	2	3
1	1.000	0.000	0.000
2	4.729	0.000	0.000
3	412.5	0.000	0.000
4	0.000	0.000	0.000
5	0.000	1.116	0.000
6	0.000	.988	0.000
7	0.000	0.000	1.000

Lambda X

	1	2	3
1	1.000	0.000	0.000
2	0.000	1.000	0.000
3	0.000	0.000	1.000

Beta

	1	2	3
1	1.000	0.000	0.000
2	-4.266	1.000	0.000
3	.058	-.016	1.000

Gamma

	1	2	3
1	55.507	59.681	34.026
2	-30.944	-29.000	-22.966
3	0.000	0.000	0.000

Phi

	1	2	3
1	.188		
2	-.063	.188	
3	-.063	-.063	.188

Psi

	1	2	3
1	52.454		
2	94.548	-221.433	
3	-2.079	1.947	.247

Theta Eps

	1	2	3	4	5	6	7
1	107.427	29.364	19.365	29.990	40.390	26.163	0.000

Theta Delta

	1	2	3
1	0.000	0.000	0.000

Table I7. Model II: Maximum Likelihood Solution Center

IND = 4

Lambda Y

	1	2	3
1	1.000	0.000	0.000
2	2.553	0.000	0.000
3	2.238	0.000	0.000
4	0.000	1.000	0.000
5	0.000	1.026	0.000
6	0.000	.913	0.000
7	0.000	0.000	1.000

Lambda X

	1	2	3
1	1.000	0.000	0.000
2	0.000	1.000	0.000
3	0.000	0.000	1.000

Beta

	1	2	3
1	1.000	0.000	0.000
2	-1.612	1.000	0.000
3	-.011	.005	1.000

Gamma

	1	2	3
1	101.271	112.531	63.577
2	42.814	59.739	30.885
3	0.000	0.000	0.000

Phi

	1	2	3
1	.188		
2	-.063	.188	
3	-.063	-.063	.188

Psi

	1	2	3
1	123.334		
2	424.863	-365.338	
3	1.775	-3.059	.228

Theta Eps

	1	2	3	4	5	6	7
1	79.958	38.214	33.692	35.526	42.890	35.973	0.000

Theta Delta

	1	2	3
1	0.000	0.000	0.000

Chi-Square with 30 degrees of freedom is 1453.9611; Probably Level = 0.0000.

Table I8. Model II: Standardized Solution Center

Lambda Y

	1	2	3
1	45.207	0.000	0.000
2	115.431	0.000	0.000
3	101.169	0.000	0.000
4	0.000	99.062	0.000
5	0.000	101.636	0.000
6	0.000	90.468	0.000
7	0.000	0.000	.499

Lambda X

	1	2	3
1	.434	0.000	0.000
2	0.000	.434	0.000
3	0.000	0.000	.434

Beta

	1	2	3
1	1.000	0.000	0.000
2	-.736	1.000	0.000
3	-.981	.975	1.000

Gamma

	1	2	3
1	.971	1.079	.609
2	.187	.261	.135
3	0.000	0.000	0.000

Phi

	1	2	3
1	1.000		
2	-.335	1.000	
3	-.335	-.335	1.000

Psi

	1	2	3
1	.060		
2	.095	-.037	
3	.079	-.062	.914

Theta Eps

	1	2	3	4	5	6	7
1	79.958	38.214	33.692	35.526	42.890	35.973	0.000

Theta Delta

	1	2	3
1	0.000	0.000	0.000

Chi-Square with 30 degrees of freedom is 1453.9611; Probability Level = 0.0000.

Table I9. Model III: Input Data

P = 7
Q = 3
M = 3
N = 3
NP = 240
Logical Indicators = TTTFTFT
Integer Indicators = 133
Estimated Time in Seconds = 200

SYY

	1	2	3	4	5	6	7
1	2.497						
2	2.480	2.469					
3	2.465	2.450	2.440				
4	.268	.268	.263	.034			
5	.234	.237	.231	.031	.034		
6	.250	.251	.250	.031	.030	.034	
7	-.005	-.006	-.004	.002	-.001	.004	.248

SXY

	1	2	3	4	5	6	7
1	.234	.243	.238	.027	.031	.028	.028
2	.257	.250	.247	.041	.033	.035	.003
3	.191	.184	.190	.002	-.002	.004	-.034

SXX

	1	2	3
1	.188		
2	-.063	.188	
3	-.063	-.063	.188

Table I10. Model III: Initial Solution

Lambda Y

	1	2	3
1	1.000	0.000	0.000
2	.993	0.000	0.000
3	.992	0.000	0.000
4	0.000	1.000	0.000
4	0.000	1.000	0.000
5	0.000	.961	0.000
6	0.000	.892	0.000
7	0.000	0.000	1.000

Lambda X

	1	2	3
1	1.000	0.000	0.000
2	0.000	1.000	0.000
3	0.000	0.000	1.000

Beta

	1	2	3
1	1.000	0.000	0.000
2	-.415	1.000	0.000
3	-.415	-.490	1.000

Gamma

	1	2	3
1	.518	.519	.514
2	.439	.396	.441
3	0.000	0.000	0.000

Phi

	1	2	3
1	.188		
2	-.063	.188	
3	-.063	-.063	.188

Psi

	1	2	3
1	.525		
2	-.103	.319	
3	-.107	.235	.388

Theta Eps

	1	2	3	4	5	6	7
1	.057	.135	.056	.058	.068	.072	0.000

Theta Delta

	1	2	3
1	0.000	0.000	0.000

Table Ill. Model III: Maximum Likelihood Solution

IND = 2

Lambda Y

	1	2	3
1	1.000	0.000	0.000
2	.994	0.000	0.000
3	.988	0.000	0.000
4	0.000	1.000	0.000
5	0.000	.943	0.000
6	0.000	.934	0.000
7	0.000	0.000	1.000

Lambda X

	1	2	3
1	1.000	0.000	0.000
2	0.000	1.000	0.000
3	0.000	0.000	1.000

Beta

	1	2	3
1	1.000	0.000	0.000
2	-1.040	1.000	0.000
3	.160	-1.513	1.000

Gamma

	1	2	3
1	3.680	3.744	3.486
2	-3.429	-3.453	-3.336
3	0.000	0.000	0.000

Phi

	1	2	3
1	.188		
2	-.063	.188	
3	-.063	-.063	.188

Psi

	1	2	3
1	.006		
2	-.001	-.000	
3	-.007	.002	.252

Theta Eps

	1	2	3	4	5	6	7
1	.037	.059	.066	-.028	.064	.073	0.000

Theta Delta

	1	2	3
1	0.000	0.000	0.000

Chi-Square with 30 degrees of freedom is 610.091; Probability Level = 0.0000.

Table I12. Model III: Standardized Solution

Lambda Y

	1	2	3
1	1.573	0.000	0.000
2	1.564	0.000	0.000
3	1.554	0.000	0.000
4	0.000	.181	0.000
5	0.000	.171	0.000
6	0.000	.169	0.000
7	0.000	0.000	.498

Lambda X

	1	2	3
1	.434	0.000	0.000
2	0.000	.434	0.000
3	0.000	0.000	.434

Beta

	1	2	3
1	1.000	0.000	0.000
2	-9.020	1.000	0.000
3	.507	-.551	1.000

Gamma

	1	2	3
1	1.014	1.032	.961
2	-8.200	-8.257	-7.978
3	0.000	0.000	0.000

Phi

	1	2	3
1	1.000		
2	-.335	1.000	
3	-.335	-.335	1.000

Psi

	1	2	3
1	.002		
2	-.004	-.009	
3	-.009	.018	1.017

Theta Eps

	1	2	3	4	5	6	7
1	.037	.059	.066	-.028	.064	.073	0.000

Theta Delta

	1	2	3
1	0.000	0.000	0.000

Chi-Square with 30 degrees of freedom is 610.091; Probability Level = 0.0000.

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