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ABSTRACT

A PRELIMINARY EXAMINATION OF A MODEL OF THE PROCESS OF SOCIAL INTERACTION IN THREE SITUATIONS

By

Jerome David Johnson

This dissertation proposes a model of the process of social interaction containing six categories: content, interpretation, emotion, communication, selection, and relationships.

These categories can be classified by their role in the process of exchange and by their phenomenal level. There are three phenomenal levels: the surface level (content and communication); the mediating level (interpretation and selection); and the underlying level (emotion and relationships). The categories can also be classified by their roles in the process of exchange: content, interpretation, and emotion can be viewed as the substance exchanged in the interaction, while communication, selection, and relationships represent the form by which this substance is expressed.

The relationships posited in the model are based on the classification of categories. In general the substance exchanged in the interaction is viewed as determining its form of expression. In addition, variables at a deeper phenomenal level are said to cause variables at a more surface level.

One hundred and twenty-four mail questionnaires obtained from a random sample of adults in Grand Rapids, Michigan were used to test the model of social interaction in three situations--television, radio and typical. While the characteristics of this sample generally reflects

the nature of the Grand Rapids and the United States population and the literature indicates that non-response typically has little affect on relationships between variables, the low response rate, 22.2%, suggests that only limited generalizations can be made from this data.

Ordinary least squares multiple regression (OLS) was used to determine the variance accounted for and to assess the significance level of the paths in the model. When the alternative paths are included in the model the individual multiple regressions account for at least 24% of the variation in their dependent variables with $p < .01$.

LISREL, a computer program, was used to assess the overall goodness of fit of the model to the data and to estimate individual parameters. The radio situation was used to develop and to further refine the original model presented in Chapter I. Tests in this situation indicated that two additional paths--one between emotion and content and one between relationships and communication--should be added to the model. This refined model was then tested in all situations. The χ^2 statistic indicates that the model doesn't provide a better fit to the data than would be expected by chance. However, the ratio of degrees of freedom to the χ^2 value would indicate that the model, with appropriate modifications, could eventually provide a good fit to the data.

In Chapter IV a modified model with two unobserved common variables was tested in all three situations. The addition of these common variables was expected to ameliorate some of the problems with high zeta variances, multicollinearity, and measurement errors found in the original model. They were partially successful in reducing these problems, but their main effect was to reduce the residuals. The χ^2 values approach significance and the slight difference between them and a good fit of the model to the data may be attributable to technical problems with the data and to specification errors.

In sum, the results supported the addition of two paths to the original model and suggests that all of the paths included in the original model were meaningful. The results did not support the assumptions that the values of parameters would remain invariant across different situations and that interpretations and selection act as mediators.

In Chapter V a new model is proposed that incorporates the effects of factors outside the process of social interaction, such as context, and that collapses interpretation and content into one variable labeled interpretation and reduces communication and selection to one variable termed communication. There is reason to believe that a test of this new model on a different data set would be successful.

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While my years in the Department of Communication at Michigan State were sometimes frustrating, and I could find things to quibble with in the emphasis given certain things in the Department, I must also thank the Department for giving me a feel for how to do research--something that in its own way was more valuable than any other thing in contributing toward my professional growth.

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CHAPTER I

INTRODUCTION

Social interaction is the process by which interactants express matters of substance to one another.* Many category schemes of social interaction have been proposed in the literature. However, no models of social interaction have been derived from these schemes. This dissertation will propose a model of the process of social interaction that will be tested in three different situations.

This chapter will develop the model of social interaction. Chapter II will describe the means by which this model will be tested. Chapter III will report the results of the tests of the model in three different situations. Chapter IV will discuss methodological and substantive explanations of the results. Chapter V will conclude the dissertation with a discussion of the implications of the results and suggestions for future research.

Social interaction can be studied on at least four levels: as a dependent variable, as an independent variable, as an intervening variable, and in isolation. Examining the

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*This definition follows closely the definition proposed by Ruesch and Prestwood (1949, p. 413). "Communication (social interaction) is the process through which intention, feelings and thoughts of one person are transmitted to another."

effects of the situation, the characteristics of interactants, the context of the interaction and the rules of procedure for social interaction involves analyzing the effects of various independent variables on the dependent variable of social interaction. Social interaction has also been treated as an intervening variable through which various independent variables, such as group task or group structure, act on dependent variables, such as group effectiveness and group satisfaction. In this dissertation the process of social interaction will be examined essentially in isolation, although reference will be made to the possible effects of various independent variables on the process. No attempt will be made to examine social interaction as an intervening or independent variable. The primary emphasis here is on the development of a model detailing the relationships between the categories of acts contained in social interaction.

The model of social interaction that will be tested is contained in Figure 1. This model contains six categories of the process of social interaction: content, communication, interpretation, selection, emotion and relationships. In the following section each of the categories of social interaction will be defined, and its place in the literature examined. Once the categories have been defined the causal paths between them that constitute a model of social interaction will be detailed. Chapter I will conclude with a discussion of the possible effects of the

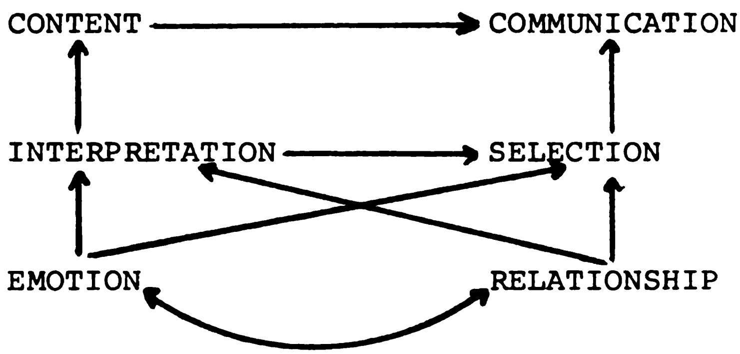

Figure 1. A Model of the Process of Social Interaction

larger context within which social interaction is embedded on relationships within the model.

Categories of Acts Within Social Interaction

Content: Content is the denotative meaning of symbols expressed during an interaction. Appendix A contains samples of category schemes that have been used in the literature to describe social interaction.* Most of the category schemes reviewed do not contain all of the categories of social interaction included in the model.** All six

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*Social interaction is used here as a generic term that includes some terms, e.g. communication, other researchers have used to describe what is meant here by social interaction.

**See Appendix B. Thirty category schemes were reviewed. Category schemes are used here as generic term. Some of the researchers intended merely to describe or define some of the elements of social interaction. They are included here to demonstrate that other researchers have frequently used these terms to describe aspects of social interaction.

researchers who cited content as a category of social interaction also cited other categories contained in the model. (Argyle, 1969; Bjerg, 1968*; Hare, 1958; Hawes, 1973; Watson, 1958*; and Watzlawick, et al., 1967.)

In general, these researchers were interested in designing category schemes for fairly abstract and widely generalizable purposes, such as Hare's attempt to establish a paradigm for the analysis of interaction or Hawes' attempt to isolate the elements of communication processes. As a result content was most frequently not defined nor elaborated upon, but rather listed along with other categories of social interaction.

Interpretation: Interpretation is the connotative meaning associated with expressed symbols. In general, category schemes that include interpretation have been designed to describe specific situations and are more limited in scope than those category schemes that contain content. Of the category schemes that include a category similar to interpretation (Auld and White, 1959; Bales, 1950; Borgatta, 1970; Crowell and Schiedell, 1961; Flanders, 1967; Gouran and Baird, 1972; Lewis, et al., 1961; Longabaugh, 1961; McGuire and Lorch, 1968; Schiedell and Crowell, 1966; Snyder, 1945; Steinzor, 1949; Strupp, 1960; and Weintraub

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*Bjerg (1968) and Watson (1958) called their categories topic agons and conversational resources respectively.

and Aronson, 1962) only five included other categories contained in the model of social interaction.

The key difference between these category schemes and the ones used for content is that they are generally less abstract and often demand that an act be placed into a more abstract category than the content that was contained in the act. This placement often demands interpretation.[1]

The category schemes that include interpretation are often intended for only a limited purpose (e.g. analysis of group problem solving, Gouran, and Baird, 1972; analysis of defense mechanisms, Weintraub and Aronson, 1962; analysis of psychotherapy, Auld and White, 1959; and analysis of student teacher interaction, Flanders, 1967). As a result they are

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[1]For example, the content of the interaction might be a group member saying "Joe, you really helped the group stick together. If it wasn't for your leadership we would have fallen apart." Now this manifest content has to be interpreted to be placed in one of Borgatta's (1965) categories. If the speaker was the actual leader of the group and there was a threat that the group would break apart if Joe's ego wasn't raised, then this statement might fall under category 2 (shows solidarity through raising the status of others). If the speaker was justly praising Joe, then it might be coded a 1 (common social acknowledgments) given this was typical praise for a group member, or an 8 (gives opinion, evaluation, analysis, expresses feeling or wish). If Joe had fallen apart in this situation and the speaker had spoken in a sarcastic tone, then this simple utterance might be coded a 3 (shows tension release, laughs). Given the outcome was favorable to the group, or a 17 (shows antagonism, hostility, is demanding) provided the outcome was unfavorable. The point is that all of these category schemes demand that a coder rely on other things than the manifest content to place a symbol exchange in one of these categories--the interaction must be interpreted.

often constructed in a manner that makes it unlikely that they could be generalized to a wide range of social interactions. Only Borgatta (1965), Longabaugh (1966), Steinzor (1949), and Bales (1950) apparently intended that their schemes be generalizable across a wide range of situations.

Emotion: Emotion reflects the affective states in an interaction. Nine of the category schemes reviewed here have included this category within their schemes (Argyle, 1969; Bjerg, 1968; Taylor, 1954; Reusch and Prestwood; 1949; Hare, 1958; Weintraub and Aronson, 1962; Carter et al., 1951; and Longabaugh, 1966). Only Taylor (1954), who was attempting to describe the emotional dimensionality of groups, and Reusch and Prestwood (1949), who were attempting to define the structural components of interaction, fail to include another category of social interaction contained in the model in their category schemes. All save Weintraub and Aronson (1962). Argyle (1969), and Carter et al., (1951) intended their category schemes to be used for rather abstract, general purposes. The greatest number of subcategories within emotion identified by any of these category schemes is three; the public dimension, dyadic dimension and autistic dimension, by Taylor (1954).

Communication: Communication refers to acts of symbol transfer. Twelve of the thirty category schemes reviewed here contain categories that are similar to communication (Watson, 1958; Pope and Siegman, 1972; Speier, 1973; Bjerg, 1968; Argyle, 1969; Bostrom, 1970; McGinnies and Altman, 1958; Weintraub and Aronson, 1962; Jaffe and Feldstein, 1970; Hare, 1958; Lewis et al., 1961; and Amidon and Hunter, 1966). Only two of the ten categories, Jaffe and Feldstein's and McGinnies and Altman's, do not contain other categories of social interaction used in the model.

The category schemes are either very specific, but not exhaustive, in identifying subcategories, for example Bostrom, or are very general in characterizing communication, for example, Watson's conversational style.

The category schemes represented here appear to be equally split between those designed for specific purposes, such as the verbal analysis of defense mechanisms, Weintraub and Aronson (1962), and those designed for rather abstract purposes, e.g. Hare's paradigm for the analysis of interaction. Most of these schemes include both verbal and nonverbal acts of symbol transfer.

Selection: Selection reflects the interactant's levels of attention to elements contained in the environment of the interaction. Only four of the descriptions of social interaction reviewed here contains selection. Goffman's (1957) scheme was designed exclusively to deal with attention. Argyle (1969) included in his scheme a category for nonverbal responsiveness, which reflect signals from one interactant to another of attentiveness. Bostrom (1970) called his category selectivity and described it in terms of relative concentration, and Lewis *et al*. (1961) included listening in their category scheme. Goffman (1957) termed external preoccupation, self-consciousness, interaction consciousness, and other consciousness as forms of alienation from interaction, or in other words forms of selection. All four of these researchers use their concepts to indicate the interactant's level of attention to a subset of the elements contained within social interaction.

Relationships: Relationships represent the patterns of response of the parties in the interaction to each other. Seven of the schemes for describing social interaction that have been reviewed here contain relationship categories (Hawes, 1973; Hare, 1958; Bjerg, 1968; Pope and Siegman, 1972; Watzlawick, *et al*., 1967; Speier, 1973; and Argyle, 1969). All save Pope and Siegman (1972) and Argyle (1969) intended their schemes to be applicable across a wide range of social interaction situations, and conceived of their categories at relatively abstract levels. All of these schemes contain other categories of social interaction contained in the models.

Some of the category schemes that contain relationships deal with specific subcategories of relationships (Bjerg, Hare, Pope and Siegman, Argyle, and Speier) and some (Hawes and Watzlawick *et al*.) just use the term relationships to describe this category. None of the schemes that mention specific subcategories would appear to have exhaustively described the major types of relationships that could exist in social interaction.

Summary: The model of social interaction posited in this paper is composed of six categories: content, interpretation, emotion, communication, selection, and relationships.

Content is the denotative meaning of symbols expressed during an interaction.

Interpretation is the connotative meaning associated with expressed symbols.

Emotion reflects the affectives states in an interaction.

Communication refers to acts of symbol transfer.

Selection reflects the interactant's level of attention to elements contained in the environment of the interaction.

Relationships represent the patterns of response of the parties in the interaction to each other.

Overview Of Previous Descriptions Of The Categories Of Social Interaction

Before the causal relationships between the categories of social interaction are detailed, a brief overview of previous category schemes is in order. Appendix B contains a listing of the category schemes indicating the categories of social interaction contained in this model that they include. Appendix A describes the schemes in more detail including categories the author's described as being included in social interaction that aren't contained in the model developed here.*

When examined in their entirety, rather than category by category, several criticisms can be leveled against the category schemes contained in Appendix A.

First, they are often designed to serve only a limited purpose, such as the analysis of teacher-student interaction, psychotherapy sessions, or group decision making. As a result these schemes have only limited applicability to a wide range of social interaction situations. For example, none of the schemes reviewed here is suited for "aimless," non-directed conversation.

Second, the schemes often fail to focus on the process of social interaction. Traditionally studies of interaction have followed a classic independent/dependent variable paradigm where "inputs" of social interaction (e.g. setting, context) are examined for their effects on "outputs" or the effects of social interaction such as changes in self-concept,

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*Some of the schemes reviewed here include categories not included in the model of social interaction presented here. Two of these other categories are sequences (Argyle, 1969), an increasingly popular means of examining social interaction (Stech, 1975), and rules (Bjerg, 1968). However, the nature of the sequence is the important thing. Sequences and rules should be viewed as means of analyzing various categories of social interaction, not as categories themselves.

The other categories used to describe social interaction in these schemes are related to situational variables that effect social interaction and which will be described later in this chapter.

attitude change, information gain or need fulfillment.

> Several recent criticisms of research on face-to-face behavior have suggested that designs are too often 'input-output' rather than 'process' oriented. . . . That is typically some independent 'input' variable is manipulated (e.g., leadership style) in order to see the effect on a cumulative 'output' variable (e.g. the quantity of work accomplished), whereas the interaction itself is not examined (Roger and Jones, 1975, p. 113).

Studies that focus on inputs and outputs neglect the process of social interaction, they treat it as a black box.

> Too often . . . small group research efforts have purported to investigate 'process' by subjecting groups to various 'input' variables of the HSM (Human System Model) - e.g., members, group structure, task conditions, and measuring 'output variables' e.g. productivity, cohesiveness, efficiency. The conclusion of the research infers that the intervening interactive behavior accounted for the obtained relationship. But measuring 'input' and 'output' does not study process. Only direct investigations of the intervening behavior--the group interaction--can claim to be a study of process (Fisher and Hawes, 1971, p. 452).

This focus has resulted in categories that have only limited usefulness in modeling the process of social interaction.

Three, quite frequently schemes have omitted elements of social interaction mentioned by other researchers. Three of the schemes, Argyle (1969), Bjerg (1968) and Hare (1958), incorporate five of the categories. Of the thirty schemes reviewed only these three identify a substantial number of the categories of social interaction contained in the model. In fact most (16) only identify one element of social interaction. Of all of the elements of social interaction interpretation is the most frequently represented (15), followed by communication (12), emotion (8), relationships (7), content (6) and selection (4). Lennard and Bernstein (1969) sum up the current situation well.

> A search through clinical and research literature (on social interaction) in the family and other social systems will locate few comprehensive category schemes, especially ones which are completely described and complete with definitions and indicators that make the system useful to other students.

Four, category schemes, as a result of their limited range, have often neglected the rich and simultaneous interplay of a number of elements of social interaction (Bjerg, 1968). One of the reasons for a dearth of models would appear to be an incomplete description of the process, which handicaps conceptual development.

Causal Relationships In The Model

The lines between the categories in Figure 1 detail the proposed causal relationships in the model of social interaction. A straight line indicates a causal path, with the arrow indicating the direction of causality. For example, the straight line between interpretation and content with the arrow pointing to content indicates that interpretation causes content. Only one relationship in this model is not causal, that between emotion and relationships; this non-causal relationship (correlation) is indicated by a curved line with the arrows pointing to both variables.

Two means of classifying the categories of social interaction will be used as the basis for determining the causal relationships between variables in this model: the role of the category in the process of exchange and the phenomenal level of the category. Figure 2 presents a classification of the categories of social interaction by these two means.

	Role in the Process of Exchange	
Phenomenal Level of Interactive Element	Substance	Form of Expression
Surface	Content	Communication
Mediating	Interpretation	Selection
Underlying	Emotion	Relationship

Figure 2. Classification of the Categories of Social Interaction

The categories of social interaction can be classified into three phenomenal levels. The first level is the surface level which contains the most readily manifested and objective of the categories: communication and content. The second level is the mediating level. The mediating categories, interpretation and selection, mediate the surface and underlying categories. The underlying categories, emotion and relationships, are the primary determinants of the other elements.

The underlying categories cause the mediating categories which in turn cause the manifest variables that serve similar roles in the process of exchange. Thus emotion, an underlying category, is seen as causing both interpretation and selection. It is a fairly commonplace notion that the emotions that parties in an interaction feel toward each other color their interpretations and they affect the degree of attention interactants pay toward each other.

Relationship is an underlying category partly because "interaction grows out of the roles we play, the defined relationships we have in various groups" (Ittelson, et al., 1970, p. 127). Relationship is one of the determinants of interpretations and selection. Naturally the interpretations attached to the substance of the interaction are dependent upon the relationships between interactants. In addition, whom is attended to and what level of attention is given is also heavily dependent upon the nature of the relationship between interactants.

The mediating categories, in this framework, are the mechanisms that translate the underlying variables into the manifest acts in the interaction. Thus interpretation is said to cause content and selection is said to cause communication. Selection in this model is one of the determinants of whose messages are attended to and to whom messages are given. Selection then is a necessary antecedent of any communicative act.

The two underlying variables may be correlated in this model. The nature of emotion and relationships and their role as the exogenous variables in the process dictate that there not be a causal path between these two variables.

There are two primary roles a category can assume in the process of exchange: substance and form of expression (Hare, 1958). The content, interpretation and emotion categories represent the substances that are exchanged during an interaction. How the substance is exchanged is reflected in the form of expression elements: communication, selection and relationships. Since it is expected that the substance to be exchanged will determine the manner in which the substance is transmitted, the model contains causal paths from the substance to the form of expression elements at the mediating and manifest levels. Thus it is expected that the content that is to be transmitted will partially determine the communication pattern in the interaction and the interpretation of the symbols in the interaction will partially determine the level of attention in the interaction.

The model presented in Figure 1 represents an elegant, parsimonious representation of the relationships among the categories. Some additional paths could reasonably be added to the model. One set of relationships that would appear to have some empirical support are causal paths between the underlying and surface categories which share a common role in the process of exchange. In the model it is suggested that these relationships are mediated by interpretation and selection, but a case can be made for a direct relationship between these categories.

A causal path between relationships and communication has received some empirical support (Pope and Siegman, 1972). Roles have also been said to determine the communication systems of interactants (Kees and Reusch, 1970, and Ervin-Tripp, 1964).

Another set of paths that could reasonably be added to the model are crossed paths between relationship and content and between emotion and communication. The logic here is that the underlying variables are truly determinants of every variable within the system. Thus the relationships between the interactants is seen as determining the content of the interaction.

Similarly emotion and communication might be related. Thus the level of emotion could determine communication patterns within the interaction (Adams, 1967). For example in a highly emotional interaction interactants may talk more quickly, less fluently, and have a higher pitch in their voice.

Effects Of Other Factors

Most studies of social interaction have been concerned with examining the factors that affect social interaction and their relationship to possible outputs of social interaction, such as attitude change, conflict resolution, and decision making. Here the primary focus is on the process, and outputs won't be discussed. However, inputs, those factors that affect the process of social interaction, may have an effect on the tests of the model. Hopefully the basic causal relationships in the model are invariant in direction and magnitude across situations, but if they are not, the source of the differences may be variables which, while not directly involved in the process of social interaction, are intimately related to it.

The literature has identified four major situational factors that impinge upon social interaction: (1) culturally and/or biologically determined rules of procedure (Speier, 1973; Malone, 1975; and Ittelson, *et al*., 1970); (2) psychological and physical characteristics of the interactants (Hackman and Morris, 1975; Malone, 1975; Bales, 1950; and Ittelson, *et al*., 1970); (3) the setting within which the interaction occurs (Malone, 1975; Bales, 1950; Hackman and Morris, 1975; Speier, 1973; and Ittelson, *et al*., 1970); (4) the context of the interaction, including its historical antecedents, the purposes of the interactants, and the tasks they are performing (Hackman and Morris, 1975; Malone, 1975;

Lennard and Bernstein, 1969; and Speier, 1973).

In this section the possible effects of these factors on the model will be examined, with particular attention being given to their effects in the three situations within which the model will be tested.

The three situations in which the model will be tested--radio, television, and typical--primarily involve "aimless" conversation in a familiar setting. Little is known about the nature of interaction in the radio and typical situations, but a limited amount of research has been conducted on interaction that is embedded in the television situation. Forty percent of respondents in a national survey (LoSciuto, 1972) reported interacting during particular television programs. In the same survey it was reported that 32% of programs were watched alone; 43% in the company of one person; and 25% of the programs were watched with more than one other person. This suggests that social interaction in the presence of television occurs quite frequently.

There is some suggestive evidence that rules determine the patterns of interaction in television situations. For example, Maccoby (1951), in an early study, found that 58% of all respondents reported that they talked very little or not at all when in the presence of television; 20% reported that conversations occurred at certain specified times (such as during commercials); 11% said that their conversations were limited to comments about the programming; and only 11% reported that they talked quite a bit. Social interaction in the presence of television tends to be discontinuous, with more or less formal rules covering such manifestations of interaction as content and communication (Johnson, 1976). The timing of communication is often dependent on TV, conversation occurring mainly during commercials or lulls in the show (Johnson, 1976). Social interaction in the presence of radio tends to be very similar to social interaction the typical situation. Differences in rules would lead us to expect that the nature of the relationships between communication and content and the other categories would be somewhat different in the television situation than it is in the other two situations.

Certain individual characteristics such as predispositions to attend to the media, tolerance to distractions in the environment, and capacity to handle complex stimulus inputs all would appear to have an affect on particular social interactions in the presence of involving media. The effect of television on these factors should be much more pronounced, causing relationships between selection and the other elements to be more unstable in the television situation.

The context of the interaction is similar in all three situations. The interactants are generally engaged in sociable "aimless" conversation. In their national surveys in 1960 and in 1970 Steiner (1963) and Bower (1973) asked respondents how often they watched television to be sociable with other people. In 1960, 17% reported that they usually watched television to be sociable; 32% reported that they occasionally watched to be sociable; 27% reported they rarely watched to be sociable; and 24% reported that they never watched television to be sociable. The results for 1970 are very similar with 15% reporting usually, 29% reporting occasionally, 30% reporting rarely, and 26% reporting never. For families the sociability motive would appear to be especially salient. Television is often seen by family members as an excuse to be with the family and as a stimulus for interaction among family members (Lyle, 1972).

Television appears to frequently create a situation of pseudo-interaction. While television increases the amount of time that families spend together, "it appears that the increased family contact brought about by television is not social except in the most limited sense: that of being in the same room with other people" (Maccoby, 1951, p. 424). Other authors have also noted that while television appears to bring the family together, it really doesn't enhance the level or amount of their social interaction (Coffin, 1955; Robinson, 1972; and Hamilton and Lawless, 1956).

This "aimless" interaction might act to reduce the strength of the causal relationships between the elements of the model. This is especially true in the case of relationships. In contrast to a situation that demands a rigid role structure such as the completion of a task, the roles in these situations are rather diffuse. The situation themselves prescribe no clear, salient roles for the interactants. The roles that they bring to the situation are carryovers from larger contexts, such as familial roles, and they may not be salient in this situation.

Except for the presence of differing media or no media the setting of these situations should be essentially the same. Differences in settings, though slight, might introduce more random error in tests of the model. Previous research has indicated that there is a greater variety of settings within which typical interaction can occur; radio embedded interaction offers a slightly narrower range than a no media setting, and television embedded interaction appears to occur in only a limited range of settings (Johnson, 1976). However, these differences in variability are inversely related to the potential effects of the media in these situations on interaction. Thus it would be expected that, even when differences in setting are taken into account, the television situation should be the most unstable, followed by radio, and then by the typical situation.

Television appears to provide topics of conversations or the content for much of the interaction that takes place in its presence. Robinson (1972) reported that one half of the conversations in the presence of television refer to the content of the show.* Lyle (1972) reported that television provides the interactants with topics of conversation.

In this section four major situational factors--rules, context, setting, and individual differences--that might affect the relationships in the model of social interaction were identified and the nature of their effects were discussed for the situations in which the model will be tested. It is assumed that any differences caused by these factors are expected to be differences in degree and not in kind for the relationships in the model across the three situations.

Conclusion

In this chapter a model of social interaction which detailed the causal relationships among six categories of acts composing social interaction was presented. All of the categories--content, interpretation, emotion, communication, selection and relationships--have been used in the literature to describe social interaction. The chapter concluded with a discussion of the effects of exogenous variables on the process of social interaction in non-media and media situations.

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*Results are from self-report data.

CHAPTER II

METHODS

This chapter describes the nature of the 124 mail questionnaires returned from a simple random sample of adults enumerated in the Grand Rapids, Michigan telephone book that will be used to test the model proposed in Chapter I. Specifically the following matters will be discussed in this chapter: the rationale for selecting a mail questionnaire; the response rate; effects of non-response on relationships between variables; characteristics of the sample and the mail questionnaire.

Rationale for Selecting a Mail Questionnaire

Several different techniques could be used to gather data to test the model proposed in Chapter I. Each of these techniques has its own peculiar advantages and disadvantages. Self-administered questionnaires were used to gather the data for this study. The advantages and disadvantages of self-administered questionnaires vis a vis systematic observation, the most acceptable alternative method, will be discussed in this section.

Weick (1968) cites several disadvantages inherent in the use of self-administered questionnaires in this context.

One, involvement in an activity may cause a respondent to be unaware of crucial elements of the phenomenon. Two, when a phenomenon constitutes a process between individuals the relevance of individual reports is limited. Three, some phenomenon may be too fleeting to be noticed by respondents. In sum, the overall disadvantage of self-report techniques is that they suffer from the limitations of respondents (Lennard and Bernstein, 1969).

Self-report has several general advantages over systematic observation. One, it can provide information on a situation where it would be difficult for the researcher to obtain access. Two, the participants in an event are more aware of their aims and the aims of their fellows; thus they are better able to interpret events in the interaction (Borgatta and Crowther, 1965). Three, the very presence of an observer can change the phenomenon that the observer is measuring (Crano and Brewer, 1973). Four, self-report is generally less time consuming for the researcher and the respondent.

Self-report was chosen as the data gathering technique in this particular study because: (a) it allowed the researcher to gather information from a wide range of respondents; (b) social interaction in the particular contexts examined here would probably be considerably changed by the presence of an observer or videotape cameras; and (c) since the categories are relatively global and abstract, respondent's reports shouldn't be particulary affected by the problem of a fleeting phenomenon.

Response Rate

One of the common problems associated with mail surveys is a low response rate. This problem was exacerbated in this survey because the task set for the respondents was a difficult one, because the questionnaire wouldn't apply to every respondent in the survey, and because a substantial segment of the U.S. population, 32%, don't watch TV in the presence of another person (Lo Sciato, 1972).

As a result of these factors every possible step was taken to insure a high response rate. Regrettably the researcher didn't have enough funds to provide each respondent with some renumeration for completing the survey. However, several other steps were taken to motivate respondents to complete the questionnaire. The most important step was to make a personal telephone call (the phone call transcript is contained in Appendix C) to each respondent to get the respondent to agree to complete the questionnaire before it was mailed to them. A number of appeals were incorporated in the telephone call to increase the respondents willingness to participate in the survey (i.e., organizational affiliation, advancement of science, the usefulness of the results, etc.). An additional set of appeals were contained in the cover letter attached to the mail questionnaire (i.e., organizational affiliation, advancement of science, utility of the information, enhancement of respondent knowledge of self, and importance of results for society). Finally, respondents were called back at least once, both to encourage them to return the questionnaire and to try to rectify any problems respondents were having with the questionnaire.

Given the difficulty of the questionnaire, and the probability that a substantial proportion of the population couldn't respond to it, there was a reasonable response to the mail questionnaire[1] (see Table 1). The n of the survey to start was 653. Of these, 108 (or 16.7%) were bad cases (i.e., wrong numbers, dead, left town, etc.). This left an n of 555. Of these, 481 were reached with the initial phone call, 199 of which said they did not wish to complete the questionnaire. Of the 282 respondents that agreed to receive the questionnaire, 119, or 42.2%, eventually returned it. Some respondents were sent the questionnaires without a phone call. Only 5 of these 58 respondents returned the questionnaire. The overall response rate was 22.3%.

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[1]Some of the respondents, either on the phone or in comments attached to uncompleted returned questionnaires, indicated the reasons why they wouldn't complete the questionnaire. There were four frequently mentioned reasons for failure to complete the questionnaire: The questionnaire was too complicated for some respondents (7). Some of the respondents didn't understand the questionnaire (4). Before mailing out the questionnaire it was expected that some respondents would fail to complete the questionnaire for these reasons. These were not the most frequently cited reasons for failure to complete the questionnaire, however. To the researcher's surprise 11 respondents refused to respond because they felt the questionnaire was too personal. And, as was expected, some respondents (10) said that the questionnaire didn't apply to them.

Table 1

Response to Mail Questionnaire

Condition	Returned Questionnaire	Questionnaire Not Returned	=	Row Total
Initial Call	55	199		254
Row %	21.6%	78.3%		
Initial Call and Callbacks	64	163		227
Row %	28.2%	71.8%		
Summary of Responses with Initial Call	119	362		481
Row %	24.7%	75.2%		
No Initial Call, No Second Call, but Mailed	5	58		63
Row %	7.9%	92.1%		
No Initial Call, but Call After Mailed	0	11		11
Row %	0	100%		
Summary Row for All Responses	124	431		555
Row %	22.3%	77.7%		

Effects of Nonresponse on the Relationships Between Variables

The rate of the return to this questionnaire raises some question about the results reported here. The precise estimate of population parameters from this data would be extremely difficult. The central concern of this study, however, is an exploratory examination of the relationships among the variables constituting social interaction, not the identification of the exact values of the parameters in a given population.

What is the effect of nonresponse on the relationships among variables? A number of studies have examined this question for bivariate relationships in mailed self-report questionnaires. Goudy (1956) found, in a relatively homogeneous population, that there were relatively slight differences in the strength of relationships between late and early respondents to a mail questionnaire. Kivlin (1965), in a study that compared respondents and nonrespondents by completing the total sample, found that there was no differences in the relationships among variables between respondents and nonrespondents. Lehman (1963), in a comparison of early and late return, found that there was no difference in the relationship between variables. Schwirian and Blaine (1967) found that while two of the questions they examined showed no differences between early and late responses in the relationships among certain variables, that for the third question they examined there were significant differences, but this question was tied to a characteristic of respondents that strongly differentiated respondents from nonrespondents. Suchman (1972), in an examination of numerous relationships, found that these relationships remained unchanged between respondents and nonrespondents. He went on to note that "these data do appear strongly suggestive of a current overemphasis upon 100 per cent response to a survey when one is concerned with relationships rather than the description of frequency distributions." These studies suggest that even when nonresponse is a problem in a survey, the relationships among the variables studied remain stable, and, at least for the overwhelming preponderance of studies, nonresponse doesn't significantly change the relationships among the variables studied. However, the data reported here still should be treated as only suggestive of the actual relationships among the variables in the popualtion.

Characteristics of the Sample

Table 2 compares various demographic characteristics of the sample with the distribution of these characteristics within the Grand Rapids area and within the United States. The questions used to gather this information are on page 8 of the mail questionnaire. The census figures for Grand Rapids and the United States are for 1971 (Bureau of the Census, 1973 and Bureau of Census, 1972) while the sample was drawn in 1976, as a result slight discrepancies between the sample and the 1971 figures can be expected. The sample had

Table 2

Characteristics of the Sample, of Grand Rapids and of the United States

Characteristic	Sample	Grand Rapids*	United States+
Sex			
Male	42.5	47.8	48.4
Female	57.5	52.2	51.6
Race			
White	97.5	92.9	86.7
Black	2.5	6.5	11.0
Other	0.0	.6	1.4
Age			
13+	89.3	63.1	65.4
65+	10.7	9.5	9.8
Average age	43.2	29.5	33.4
School (Years)			
Less than 5	.8	2.5	5.5
6-12	42.1	55.4	32.6
13-16	43.0	31.5	49.5
16+	14.0	10.6	12.5
Income***			
Less than $3000	8.1	6.7	**
$3000-$4999	7.0	7.0	
$5000-$6999	9.3	9.2	
$7000-$9999	10.5	21.5	
$10,000-$14,999	24.4	32.4	
$15,000-$24,999	27.9	18.1	
$25,000+	12.8	5.1	
Number of Persons in Household	2.8	3.2	
Marital Status			
Single	9.2	**	16.2
Married	81.7	**	71.6
Divorced	2.5	**	3.2

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*Bureau of the Census, 1973

**Statistics Unavailable

***Family

+Bureau of the Census, 1972

a greater proportion of females and of whites, than the United States and Grand Rapids populations. Since the questionnaire was not intended to be filled out by children it is only natural that the average age of respondents is greater than the U.S. or Grand Rapids average age, but the percentage of respondents over 65 is quite close to the U.S. and Grand Rapids figures. While there were differences in the education of the sample compared to Grand Rapids, the sample, in general, reflected the relative proportions of the population contained in the various strata. While all family income groups were represented in the sample and groups with incomes under $7000 were essentially the same as the Grand Rapids figures, the middle income groups from $7000 to $14,999 were underrepresented and the higher income groups, $15,000 +, were overrepresented. There were fewer single people and more married people contained in the sample. However, married people might be more likely to return the questionnaire, since they are probably more likely to watch television with another person.

Several other demographic questions were asked in the questionnaire. Respondent reported that they owned an average of 3.7 radios and 1.9 televisions. Substantial numbers, 73.3% of the respondents reported owning a color television set. The respondents indicated that they felt they belonged to the following social classes: upper class, 2.7%; middle class, 63.7%, working class, 35.1%; and no respondents reported that they belonged to the lower class; 60.8% of the respondents reported that they were employed. The respondents worked 49.6 hours a week on the average and reported that they had 30.2 hours a week of free time.

The Mail Questionnaire

The mail questionnaire (see Appendix D) contained a cover letter and 7 pages of questions. During a pretest it took respondents 30 to 40 minutes to complete the questionnaire.

The respondents received the questionnaire in a hand addressed envelope. A return, stamped, preaddressed envelope was enclosed.

Before the questionnaire was sent to the respondents it was pretested on several adult respondents. These respondents were selected at random from the Lansing metropolitan telephone book and the questionnaire was administered in their homes. These sessions were taped recorded and respondents were encouraged to make comments while filling out the questionnaire. They were also asked several questions concerning the questionnaire after they had completed it. As a result of these pretests more detailed instructions were included in the final questionnaire, the strength of the appeals were increased, simpler wording was used, the order of some of the questions was changed, and some synonyms were substituted for certain difficult words. On the whole the respondents in the pretest demonstrated that with the proper effort they could answer the kinds of questions that were used in the questionnaire.

In general, the questions were arranged in the questionnaire so that the easiest questions concerning the phenomenon of interest were at the beginning. This was done to get the respondents involved in filling out the questionnaire before he came to the most difficult and potentially frustrating questions. Personal questions came at the end of the questionnaire. The most descriptive and concrete questions also came at the beginning, with the questions getting progressively more theoretical and abstract as the questionnaire continued.

Pages 2, 3, and 4 of the questionnaire contain questions relating to specific hypotheses, rates of behavior of respondents, the respondents' evaluation of certain situations, the respondents' reactions to certain types of conversations, the perceived effects of the media on the respondents' conversations, respondents' degree of involvement in certain situations, and the respondents' amount of attention to certain features in the media situation.

Pages 5 and 6 contain questions 21 and 22* which test the model of social interaction. Questions 21 and 22 are designed to reveal the processual, variable nature of the elements of the model of social interaction through the use

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*All respondents were instructed to complete both questions 21 and 22.

of cross sectional questions. They do this in two ways. First, they determine the degree to which particular elements of social interaction change. Measuring elements in terms of degree of change (or in terms of the degree to which they reflect a particular property) permits the assessment of the elements of social interaction as processual variables in a way that the measurement of their presence or absence does not. It allows the elements to be treated truly as variables, instead of categories of acts, which is the traditional method of studying the elements within social interaction.*

Questions 21 and 22 examine social interaction in three situations--typical, radio, and television. These particular situations were selected for the tests of the model for a number of differing reasons. First, pragmatically, the National Association of Broadcasters was willing to fund research on social interaction in these settings. Second, research has indicated that social interaction in the presence of television may be so affected by the medium that it could constitute a state of quasi-interaction (Maccoby, 1951) that potentially could produce harmful effects. Thus comparing the television situation with interaction in other situations

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*Once the extent to which a particular element changes is determined, causality can be assessed by the multivariate analysis of the resulting variables. This multivariate analysis assesses the extent to which the change reported in any variable is attributable to another variable when other variables are controlled.

could serve as a preliminary indication of the nature of the harmful effect, if any, of television on social interaction. Three, these situations constitute a continuum of situational impacts. Research has indicated that the effects of television are pronounced, the effects of radio somewhat less so, on social interaction (Johnson, 1976). Thus these three situations permit an examination of the affect of various levels of intensity of situational factors on social interaction. Fourth, these three situations are quite common and, as a result, provide information on a substantial number of interactions that occur society wide. Respondents were given the following general instructions to be followed in answering each of the three sets of questions:

> The following directions should be followed when answering these questions. If zero (0) is the complete absence of a particular property (e.g. importance, attention, change over time, or effects) and 100 is the typical or average amount of that property that exists in a normal conversation, then rate each part of the conversation for that property. For example, if you feel a particular part, say content, is nearly twice as important as the typical part of a conversation, then put down 195. If a part is nearly one half as important, then put down 48. You can use any number you wish.

Question 21 attempted to determine the relationships between the elements of social interaction in a typical situation:

> Parts of a conversation change over time. How much do each of these parts change in a typical conversation?

Question 22 attempted to determine nature of social interaction in radio and television situations.

> Parts of a conversation often change because of the effects of things in the situation upon them. How much are the parts of your typical conversation affected by the presence of: A television playing? A radio playing?

The following elements of social interaction and brief descriptions of them followed Questions 21 and Question 22:

CONTENT: The things that you talk about.

ATTENTION:* How much you concentrate on any one thing.

EMOTION: Your level of emotional feelings, such as love, fear, determination, etc.

RESPONSIVENESS:+ The degree to which you feel others respond to what you say, are actually listening to what you say.

CLOSENESS (INTIMACY):+ The degree to which you feel close or distant to others in this situation.

PROCESS OF CONVERSING:# Amount of conversation, pauses in conversation, interruptions and ease of conversation.

MEANING:¢ Your understanding of the situation, your understanding of others, your understanding of what

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*Attention is an indicant of selection.

+Responsiveness, closeness, and roles are indicants of relationships.

#Process of conversing and conversation options are indicants of communication.

¢Meaning is an indicant of interpretation.

is said.

ROLES:[+] Knowledge of who you are in terms of labels like friend, mother, spouse, etc.

CONVERSATION OPTIONS:[#] When to listen, when to speak, what to listen to, and with whom to speak.

<u>Conclusion</u>

In this chapter the reasons why a mail questionnaire was chosen over other data-gathering techniques were cited; the response rate was reported; the effects of non-response on relationships between variables was discussed; characteristics of the sample were presented; and the nature of the questionnaire was examined. The following chapter will use the data elicited by these methods to test the model of social interaction presented in Chapter I.

[+]Responsiveness, closeness, and roles are indicants of relationships.

[#]Process of conversing and conversation options are indicants of communication.

CHAPTER III

RESULTS OF TESTS OF THE MODEL

In this chapter the results of the tests of the models of social interaction proposed in Chapter I will be reported. First the descriptive statistics and correlations for each of the models will be presented, then ordinary least squares (OLS) multiple regression will be used to assess the variance accounted for by the paths contained in the models. Next the goodness of fit of the model to the data will be determined by LISREL, a computer program that estimates the parameters in a system of linear equations.

Means and Standard Deviations

The means and standard deviations for the variables in the typical situation are contained in Table 3.* The means for the variables range from a low of 83.23 for the role indicant of relationship to a high of 116.23 for interpretation. The standard deviations either center around 50, as is the case for content, emotion, the process of conversing, selection and responsiveness, or are greater than 90,

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*The skewness and kurtosis of the variables in all of the models reveal that they do not depart markedly from a normal distribution.

Table 3

Means and Standard Deviations for Variables
in Typical Situation

Variables	Means	Standard Deviations
Content	99.27	49.14
Interpretation	116.23	131.36
Emotion	102.90	52.75
Communication:		
Process of Conversing	90.22	62.76
Conversation Options	111.65	122.60
Selection	97.85	43.89
Relationships:		
Role	83.23	106.22
Closeness	96.52	92.71
Responsiveness	99.63	53.91

N=79

which is the case for interpretation, conversation options, roles, and closeness.

The means and standard deviations for the variables in the television situation are contained in Table 4. The means here showed slightly greater dispersion than the means for the typical situation ranging from 76.01 for roles to 162.00 for process of conversing. The standard deviations are always greater than 60.87, with the standard deviation for process of conversing being exceptionally high, 515.5.

The means and standard deviations for the variables in the radio situation are contained in Table 5. The means, as has been reported elsewhere (Johnson, 1976), for this situation indicate that radio doesn't have as great an effect on the elements of social interaction as television does. The values of the means range from 71.73 for role to 97.65 for conversation options. Standard deviations, save for the standard deviation for conversation options (122.53) range from 50.13 for responsiveness to 69.83 for interpretation.

Correlation Matrices

The correlation matrices reported here are used in three ways. One, they assess the simple level of association between any two variables contained in model. Two, the correlation matrices are the input into the LISREL program. Three, the correlation matrices and calculations associated with them are used as a diagnostic tool in determining shortcomings in a model tested by means of LISREL.

Table 4

Means and Standard Deviations for
Variables in TV Situation

Variables	Means	Standard Deviations
Content	107.20	71.57
Interpretation	103.87	89.97
Emotion	89.75	60.87
Communication:		
Process of Conversing	162.00	515.58
Conversation Options	109.92	128.54
Selection	119.69	95.73
Relationships:		
Roles	76.01	70.14
Closeness	87.42	71.30
Responsiveness	86.67	71.19

N = 93

Table 5

Means and Standard Deviations for
Variables in Radio Situation

Variables	Means	Standard Deviations
Content	80.08	50.75
Interpretation	80.07	69.63
Emotion	77.93	55.24
Communication:		
Process of Conversing	73.75	53.92
Conversation Options	97.65	122.53
Selection	79.72	54.99
Relationships:		
Role	71.73	58.13
Closeness	76.68	57.93
Responsiveness	75.38	50.13

N = 88

The correlation matrix for the elements of social interaction for a typical situation are contained in Table 6.* The correlations reported in this matrix range from .0121 for content-role to .8958 for closeness-conversation options. The correlations for meaning-conversation options, closeness-meaning, conversation options-role, and closeness-role are all greater than .8. Most of the correlations fall in a range from .4 to .6.

The correlation matrix for the elements of social interaction contained in the television situation are contained in Table 7. The correlations in this matrix range from -.0603 for role and process of conversation to .6868 for closeness and conversation options. Most of the correlations fall in a range from .3 to .6.

The correlation matrix for the radio situation is contained in Table 8. The correlations range from .2790 for content-conversation options to .8237 for interpretation-process of conversation. Most of the correlations fall in a range from .45 to .7.

Multiple Regression Results

In this section OLS multiple regressions associated with each dependent variable will be reported. These

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*The scattergrams for bivariate relationships among all of the indicants in all of the situations indicate that there are no substantial departures from linearity.

Table 6

Pearson Correlations Among Social Interaction Variables in Typical Situation

	Meaning	Content	Selection	Conver-sation Options	Process of Con-versing	Closeness	Respon-siveness	Role	Emotion
Meaning	1.0000								
Content	.1074	1.0000							
Attention	.2047	.4454	1.0000						
Conversation Options	.8757	.0448	.3119	1.0000					
Process of Conversing	.6973	.1735	.3797	.6755	1.0000				
Closeness	.8625	.1255	.2709	.8958	.6893	1.0000			
Responsiveness	.2156	.4275	.6090	.2392	.5342	.2322	1.0000		
Role	.7767	.0121	.1957	.8649	.5284	.8385	.0660	1.0000	
Emotion	.4197	.5378	.5832	.4316	.5421	.5025	.6224	.3276	1.0000

N = 79

Table 7

Pearson Correlations Among Social Interaction Variables in Television Situation

	Meaning	Content	Attention	Conversation Options	Process of Conversing	Closeness	Responsiveness	Role	Emotion
Meaning	1.0000								
Content	.4146	1.0000							
Attention	.6546	.5482	1.0000						
Conversation Options	.5698	.2337	.4088	1.0000					
Process of Conversing	.2694	.1588	.2394	.6402	1.0000				
Closeness	.6326	.4537	.5744	.6868	.2878	1.0000			
Responsiveness	.5696	.4289	.5723	.5406	.3436	.5334	1.0000		
Role	.5493	.3447	.2863	.3630	.0603	.4429	.3822	1.0000	
Emotion	.5354	.3373	.3903	.4213	.0788	.5261	.5311	.5371	1.0000

N = 93

Table 8

Pearson Correlations Among Social Interaction Variables in Radio Situation

	Meaning	Content	Selection	Conversation Options	Process of Conversing	Closeness	Responsiveness	Role	Emotion
Meaning	1.0000								
Content	.5359	1.0000							
Attention	.4673	.4994	1.0000						
Conversation Options	.5088	.2790	.6918	1.0000					
Process of Conversing	.8237	.5247	.5021	.4853	1.0000				
Closeness	.7264	.4216	.5087	.5992	.6965	1.0000			
Responsiveness	.5169	.6259	.5396	.5228	.5067	.6107	1.0000		
Role	.6261	.4980	.3984	.3983	.5684	.5660	.4478	1.0000	
Emotion	.4517	.6484	.5817	.5161	.5029	.5314	.7106	.4359	1.0000

N = 88

multiple regressions will be used as indicators of the significance of individual paths in the models. They will also provide information about how much of the variability in the dependent variables in the model is explained by its associated independent variables. The OLS multiple regressions reported here will not be used to estimate values of parameters contained in the models. LISREL, by controlling for many of the problems associated with estimation of parameters, is a much more appropriate technique for this purpose.

The ordinary least square multiple regressions for paths contained in Model I, in the TV situation are reported in Table 9. The multiple regressions for content, conversation options, interpretation, and selection are all significant at the .01 level. The process of conversing regression while approaching significance (.06) is not significant at the .05 level. Save for process of conversing these multiple regressions account for at least 20% of the variation in their dependent variables. The multiple regressions for the interpretation and selection dependent variables account for more than 50% of the variation in these variables.

The alternative paths, discussed in Chapter I, in Model II for relationships between the content and emotion, and relationships and communication variables are reported in Table 10. All of these multiple regressions are significant at the .01 level and they account for at least 24% of the variation in their dependent variables.

Table 9

Multiple Regressions for Paths in Model I in TV Situation

Dependent Variable	Independent Variable	Beta	B	Standard Error	F	Significance	R^{2*}	Overall F	Overall Significance
Content								26.46	.01
	Interpretation	.47	.38	.07	26.46	.01	.23		
Communication (Process of Conversing)							.06	2.85	.06
	Content	.02	.18	.90	.04	.84			
	Selection	.23	1.23	.67	3.35	.07			
Communication (Conversation Options)							.20	11.24	.01
	Content	.26	.46	.21	4.90	.03			
	Selection	.25	.33	.16	4.61	.04			
Interpretation							.55	26.84	.01
	Emotion	.14	.21	.14	2.20	.14			
	Relationship								
	(Closeness)	.36	.46	.11	15.87	.01			
	(Role)	.20	.26	.11	5.04	.03			
	(Responsiveness)	.23	.29	.12	5.95	.02			
Selection							.51	18.14	.01
	Emotion	-.03	.16	.16	.07	.78			
	Relationship								
	(Closeness)	.22	.14	.14	4.55	.04			
	(Role)	-.14	.13	.13	2.08	.15			
	(Responsiveness)	.23	.14	.14	5.13	.03			
	Interpretation	.46	.12	.12	17.20	.01			

*Cumulative, n = 93

Table 10

Multiple Regressions for Alternative Paths in Model II in TV Situation

Dependent Variable	Independent Variable	Beta	B	Standard Error	F	Significance	R^{2*}	Overall F	Overall Significance
Communication (Process of Conversing)							.24	5.38	.01
	(Role)	-.32	-2.33	.80	8.39	.01			
	Selection	-.01	-.05	.70	.00	.95			
	Responsiveness	.31	2.24	.90	6.22	.02			
	Content	-.05	-.38	.92	.17	.69			
	(Closeness)	.35	2.52	.98	6.58	.01			
Communication (Conversation Options)							.46	14.75	.01
	(Role)	-.02	-.04	.17	.04	.83			
	Selection	-.03	-.10	.15	.51	.48			
	(Responsiveness)	.46	.82	.19	19.17	.01			
	Content	.05	.87	.19	.20	.66			
	(Closeness)	.34	.61	.21	8.81	.00			
Content							.26	15.45	.01
	Emotion	.21	.24	.13	3.67	.06			
	Meaning	.37	.29	.09	11.77	.01			

*Cumulative, n = 79

The OLS multiple regressions for the paths in Model I in the typical situation are contained in Table 11. The content regression is not significant and accounts for essentially none of its variance. Conversation options, while approaching significance (.07) is not significant at the .05 level. The regressions for the dependent variables of interpretation, selection and process of conversing are each significant at the .01 level. The variables in the equations for process of conversing and for conversation options account for small proportions of the variance in these variables. Substantial proportions of the variance in selection (33%) and interpretation (75%) are explained by their independent variables.

The values of the alternative paths in Model II in the typical situation (Table 12) are all significant at the .01 level. The variables in the content equation account for a moderate amount of the variance (26%) in this variable. Substantial proportions of the variance in the process of conversing (65%) and the conversation options (87%) are explained for by their independent variables.

The ordinary least square multiple regressions for paths contained in Model II in the radio situation are presented in Table 13. All of the multiple regressions for Model I are significant at the .01 level. All of these multiple regressions account for substantial percentages of the variation in the dependent variables with a minimum of 30%

Table 11

Multiple Regressions for Paths in Model I in Typical Situation

Dependent Variable	Independent Variable	Beta	B	Standard Error	F	Significance	R^{2*}	Overall F	Overall Significance
Content							.00	.12	.73
	Interpretation	.04	.15	.04	.12	.73			
Communication							.11	4.75	.01
(Process of Conversing)	Content	.00	.01	.15	.16	.97			
	Selection	.33	.47	.17	8.18	.01			
Communication (Conversation Options)							.07	2.66	.08
	Content	-.15	-.37	.30	1.58	.21			
	Selection	.27	.75	.33	5.09	.03			
Interpretation							.75	55.38	.01
	Emotion	-.03	-.08	.20	.15	.70			
	Relationships (Role)	.20	.24	.14	2.95	.09			
	(Responsiveness)	.05	.13	.18	.51	.48			
	(Closeness)	.70	1.00	.17	33.66	.01			
Selection							.38	8.90	.01
	Emotion	.42	.35	.11	10.83	.01			
	Role	.25	.11	.08	1.89	.17			
	Responsiveness	.33	.27	.10	8.07	.01			
	Meaning	-.18	-.06	.06	.95	.33			
	Closeness	-.12	-.06	.11	.26	.62			

*Cumulative, n = 79

Table 12

Multiple Regression for Alternative Paths in Model II in Typical Situation

Dependent Variable	Independent Variable	Beta	B	Standard Error	F	Significance	R^{2*}	Overall F	Overall Significance
Communication (Process of Conversing)							.65	26.81	.01
	Role	.00	.00	.08	.01	.98			
	Content	-.07	-.09	.10	.91	.34			
	Responsiveness	.43	.50	.10	23.72	.01			
	Selection	.03	.05	.12	.16	.69			
	Closeness	.63	.42	.09	20.95	.01			
Communication (Conversation Options)							.87	98.55	.01
	Role	.42	.49	.10	25.54	.001			
	Content	-.12	-.29	.12	6.18	.02			
	Responsiveness	.08	.18	.12	2.16	.15			
	Selection	.09	.24	.14	2.96	.09			
	Closeness	.53	.70	.11	40.47	.001			
Content							.26	13.30	.01
	Emotion	.55	.51	.10	26.44	.01			
	Interpretation	-.16	-.06	.04	2.38	.13			

*Cumulative, n = .79

Table 13

Multiple Regressions for Paths in Model I in Radio Situation

Dependent Variable	Independent Variable	Beta	B	Standard Error	F	Significance	R^{2*}	Overall F	Overall Significance
Content							.30	36.12	.01
	Interpretation	.54	.40	.07	36.12	.01			
Communication (Process of Conversing)							.35	22.74	.01
	Content	.38	.41	.11	14.18	.01			
	Selection	.30	.29	.10	8.61	.01			
Communication (Conversation Options)							.47	38.40	.01
	Content	-.10	-.23	.22	1.12	.29			
	Selection	.73	1.63	.20	64.74	.01			
Interpretation							.60	30.82	.01
	Emotion	-.00	-.00	.13	-.00	.99			
	Relationships (Role)	.33	.39	.10	14.74	.01			
	(Closeness)	.51	.61	.11	28.53	.01			
	(Responsiveness)	.05	.69	.15	.20	.65			
Selection							.42	11.67	.001
	Emotion	.38	.38	.13	9.09	.003			
	Role	.00	.35	.11	.01	.974			
	Closeness	.13	.12	.13	.88	.35			
	Meaning	.14	.11	.11	1.10	.298			
	Responsiveness	.11	.12	.15	.65	.42			

*Cumulative, n = 88

for content and a maximum of 60% for interpretation accounted for by their independent variables.

The alternative paths for Model II in the radio situation are contained in Table 14. All of these multiple regressions are significant at the .01 level. All of these paths account for 50% or more of the variation in their dependent variables.

Introduction to Model Testing

In the coming sections the models of social interaction developed in Chapter I will be tested and refined by path analysis (or more properly the estimation of the system of linear equations which the models represent). An integral part of path analysis is the post hoc refinement of a model (Land, 1969).

"Path analysis . . . is a technique sometimes used to assess the direct contribution of one variable to another in a nonexperimental situation" (Jöreskog, 1970, p. 248). Path analysis attempts to estimate by means of a number of possible statistical techniques, the parameters of a system of linear structural equations which represent the model of a process proposed by a researcher (Jöreskog, 1970). In this paper the parameters in the model will be estimated by means of a maximum likelihood statistical technique contained in the computer program, LISREL, developed by Jöreskog and Van Thillo (1972). One of the advantages of path analysis

Table 14

Multiple Regressions for Alternative Paths in Model II in Radio Situation

Dependent Variable	Independent Variable	Beta	B	Standard Error	F	Significance	R^{2*}	Overall F	Overall Significance
Content							.50	42.00	.01
	Emotion	.32	.23	.06	13.48	.01			
	Meaning	.50	.46	.08	34.02	.01			
Communication (Process of Conversing)							.58	22.90	.01
	Role	.17	.15	.08	3.35	.07			
	Selection	.09	.09	.09	1.09	.30			
	Responsiveness	-.05	-.06	.12	.26	.61			
	Closeness	.50	.47	.09	25.04	.01			
	Content	.22	.24	.11	4.82	.03			
Communication (Conversation Options)							.61	25.13	.01
	Role	.11	.22	.19	1.42	.24			
	Selection	.55	1.23	.20	39.62	.01			
	Responsiveness	.23	.56	.26	4.75	.03			
	Closeness	.26	.54	.21	6.86	.01			
	Content	-.32	-.76	.24	10.26	.01			

*Cumulative,n = 88

is that it compells the researcher to make his assumptions concerning causal structure explicit (Costner, 1971, and Kerlinger and Pedhazur, 1973). The use of path analysis to test the models proposed here is particularly appropriate since "path analysis is an important analytical tool for theory testing. Through its application one can determine whether or not a pattern of correlations for a set of observations is consistent with a specific theoretical formulation" (Kerlinger and Pedhazur, 1973, p. 317). The values of the paths coefficients are the basis for a causal inference in path analysis. "Coefficients different from zero suggest the presence of causality and the size of the coefficient suggests the degree of causality" (Heise, 1970). Path analysis has been used in genetics, biometrics, and economics, and in the 1960's was introduced in a meaningful way to sociology and psychology (Costner, 1971).

In this chapter path analysis will be used to develop the most appropriate model in the radio situation. This refined model will then be tested in the other situations. The radio situation was chosen for the initial analysis primarily because research has indicated that the effects of radio on social interaction lie somewhere in between the effects of television and a nonmedia situation (Johnson, 1976).

Advantages of LISREL over Multiple Regression

Earlier in this chapter results from multiple regressions were used to assess the amount of variance accounted for and the significance level of individual paths in the models. It was said that LISREL would be used to test the model as a whole and to estimate individual parameters. LISREL is best suited for this purpose because it has the following advantages over multiple regression. One, LISREL estimates of parameters have minimum asymptotic sampling variability (Hauser and Goldberger, 1971, and Werts, Jöreskog and Linn, 1973). Two, traditional multiple regression estimates don't provide an estimate of the goodness of fit of the entire model to the data (Jöreskog, 1973). Three, the various parameters in the model aren't estimated simultaneously in traditional multiple regression estimates (Jöreskog, 1970). Four, multiple regression was not devised especially for the analysis of causal relations (Wright, 1921, and Goldberger, 1973). Five, the use of multiple indicators for latent variables is not handled well by traditional multiple regression estimates (Werts and Linn, 1970). Six, in traditional multiple regression, when multiple indicators are present, no estimate can be obtained of the relationships between latent variables. Seven, LISREL permits the simultaneous specification of theoretical and measurement relations (Fink, 1978). In sum, LISREL allows for the "parsimonious estimation and evaluation of complex theoretical systems" (Fink, 1977, p. 13).

Description of LISREL

LISREL is a general computer program for estimating a linear structural equation system (such as those found in path analysis) involving multiple indicators of unmeasured variables. In general, LISREL divides the model to be tested into three parts: a simultaneous linear equation model relating true exogenous and endogenous variables: a measurement model relating observed exogenous indicators to true exogenous variables, and a measurement model relating observed endogenous indicators to true endogenous variables (Wiley, 1973). Here only a brief description, enough to acquaint the reader with the main logic of LISREL and its associated terminology will be given, several other sources (Jöreskog and Van Thillo, 1972; Jöreskog, 1973; and Stein, 1976) provide a more complete description of the mathematical underpinnings of the program and its general operation.

The operations of LISREL are based on several types of parameters which are used to construct eight matrices. Following Stein (1976) the various components of the matrices are listed below:

True endogenous variables, eta (η), of which there are m.

True exogenous variables, xi (ζ), of which there are n.

Paths from xi to eta are gamma (γ).

Paths from eta to eta are alpha (α), capital A.[2*]

Paths from measured variables to or from latent (xi or eta) variables are lambda (λ), capital Λ, and are called "scale factors" (Stein, 1976).

Reflective indicators of eta are y.

Reflective indicators of xi are x.

Errors associated with measurement of y are epsilon (ε).

Errors associated with measurement of x are delta (δ).

Variances associated with eta, are zeta (ζ).

These components are used to construct eight different matrices.

The first of these matrices are Λ_x (lambda x) and Λ_y (lambda y). They are composed of the scale factors of the observed variables.

β (Beta) is the matrix that contains the values of the paths (α) between endogenous true variables.

Γ (Gamma) is the matrix that contains the values of the paths (Y) between the true endogenous (γ) exogenous (η) variables.

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*$A = I - \beta$

Φ(Phi) is the variance-covariance matrix of the exogenous variables.

ψ(Psi) is the variance-covariance matrix of the residuals of the true endogenous variables.

Θ_δ (Theta Delta) and Θ_ε (Theta epsilon) are the diagonal error standard deviations* of the x and y observed variables respectively.

It is useful to classify these matrices by whether they are associated with exogenous or endogenous variables and whether the variables are observed or true and what their sources of errors are. Exogenous variables are those variables which are not dependent for their variation upon another variable in the system. Endogenous variables are dependent upon other variables in the system for their variation (Land, 1973, and Van de Geer, 1971).

	Observed Variable	True Variable	Error Observed (Measurement)	Error True (Residual)
Endogenous	y	η	ε	ζ
Exogenous	x	ξ	δ	-

These matrices form the elements of the reconstructed variance-covariance matrix Σ which is used to assess the

*Throughout the dissertation the standard deviations reported by LISREL are converted to variances.

goodness of fit of the model to the data. The parameters of these matrices can be "of three kinds (i) fixed parameters, that have been given assigned values, (ii) constrained parameters that are unknown, but equal to one of the given parameters,* and (iii) free parameters that are unknown and not constrained to be equal to any other parameter" (Jöreskog and Van Thillo, 1972, p. 2). These matrices also serve as the elements of structural equations that compose the particular model to be tested. Thus the equation for the dependent the variables in this system is:

$$\beta\eta = \Gamma + \xi + \zeta$$

The equations for y and x the observed variables are:

$$y = \mu + \Lambda_Y \eta + \varepsilon$$
$$x = \nu + \Lambda_x \xi + \sigma$$

The following assumptions are made by the LISREL program:

(1) It is assumed that ζ is uncorrelated with ξ.

(2) β is nonsingular.

(3) The errors of measurement (ε, δ) are uncorrelated with the true variates (η, ζ) and with each other (Jöreskog and Van Thillo, 1972, p. 2).

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*None of the parameters used here are of this type.

LISREL estimates the parameters in the matrices by minimization of the derivatives associated with the components of the model. This minimization is accomplished by the Davidon-Fletcher-Powell method by successive iterations of the relevant matrix (Jöreskog and Van Thillo, 1972). This method is applied in successive iterations until a criterion is reached.*

Meaning of the χ^2 Text for Goodness of Fit in LISREL

One of the advantages of LISREL over traditional means of estimating path models is that it provides a test of the overall fit of the model to the data. This test involves a χ^2 statistic; the degrees of freedom of this χ^2 is equal to the degree of overidentification in the model (Werts, Jöreskog, and Linn, 1973). "The χ^2 test is a test of the specified model against the most general alternative that Σ is any positive definite matrix" (Jöreskog, 1974, p. 4). The probability level associated with the LISREL χ^2 test "is

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*There are two options in the program, accurate and approximate solutions. An accurate solution means that the program iterates until the magnitude of all the changes in derivatives is less than .00005. This solution is usually correct to three significant digits. For an approximate solution the iterations terminate when the decrease in function values is less than 5%. The two different solutions can produce substantially different results (Jöreskog and Van Thillo, 1972). All solutions reported here are accurate solutions. In addition all solutions come from the 1972 version of LISREL which has been followed by other more elegant versions that include, among other features, estimates of the standard errors associated with particular parameters.

defined as the probability of getting a χ^2 value larger than that actually obtained, given that the hypothesized model is true" (Jöreskog and Van Thillo, 1972, p. 32). One of the limitations of this test is that it assesses the general adequacy of the model, but that it doesn't test the model against any specific alternative (Mayer and Younger, 1975). Jöreskog (1974) has cautioned that values of χ^2 should be interpreted cautiously for, when sufficiently large samples are obtained,* almost any hypothesized model is untenable. He asserts that the real usefulness of the χ^2 test comes in determining the number of parameters in a model that are necessary for a good fit of the model to the data. The important thing, he asserts, is the differences in χ^2 values for the same model under different assumptions, not necessarily the absolute value of χ^2 itself. "In other words, the problem is to extract as much information as possible out of a sample of a given size without going so far that the result is affected to a large extent by 'noise'" (Jöreskog, 1974, p. 4).

In testing a given model, especially in assessing whether a particular set of parameters should be included in the estimated model, the important consideration in adding or subtracting parameters is that the reduction of χ^2 that

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*The χ^2 test statistic reported is only approximately distributed χ^2 and approaches a true χ^2 distribution as n increases.

is obtained by adding the parameters be large relative to the degrees of freedom that are lost by estimating those parameters. Thus if a parameter when estimated results in a substantial drop in χ^2 relative to the degrees of freedom that are lost, that parameter is adding substantially to the amount of information needed to provide an adequate fit of that model to the data. This feature of LISREL will be used in the radio situation to compare several alternative versions of the model of social interaction presented in Chapter I.

Operational Model Described in LISREL Terminology

Figure 3* contains the operational version of Model II developed in Chapter I with appropriate LISREL labels for the parameters. This model and all models tested in this dissertation are recursive because "all the causal linkages run 'one way,' that is no two variables are reciprocally related

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*The following presentations of results relies mainly on figures. The actual structural equations are contained in Appendix E. The letters used to describe variables and paths in the figures follow the nomenclature for LISREL that was presented earlier in this chapter. The diagrams themselves use several other conventions: exogenous variables are to the left and endogenous the right, straight lines be-between variables indicate a causal relationship with the arrow indicated the direction of causality. Curved lines indicate that two variables are associated, but no causal direction is specified between them. In addition to reporting the values of the paths each diagram will contain the degrees of freedom associated with the model, its χ^2 value and its probability level.

Appendix G presents the actual computer printouts associated with all tests of the model presented in this dissertation. These results are presented in matrix format which the appendix explains in some detail.

in such a way that each affects and depends on the other, and no variable 'feedback upon itself through any indirect concantenation of linkages, however circuitous'" (Duncan, 1975, p. 251).

The two exogenous variables in the model are emotion (ξ_1) and relationships (ξ_2). Emotion only has a single observed variable, x_4. Relationship has three observed variables: closeness, x_1; responsiveness, x_2; and role, x_3. These ordinary indicators represent the scale factors of these variables.

The true endogenous variables in the Figure 3 are content (η_1), communication (η_2), interpretation (η_3), and selection (η_4). There is only one observed indicator for content (y_2), interpretation (y_1) and selection (y_3). Communication has two observed indicants; conversation options (y_4) and process of conversation (y_5).

The basic model only estimates 4 of the 12 possible paths between endogenous true variables in this model. These paths are labeled α's in the model. The paths between the true exogenous variables and the true endogenous variables are labeled with γ. θ_ε and θ_δ, represent the measurement error variance* of the

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*Elements of θ reported in the body of the dissertation reflect variances, not standard deviations.

observed indicants.*

Identification of the Models

Each parameter of a model must be identified for the model to be identified. If a model is not identified the unique estimation of one or more parameters is impossible. "By identification we specifically mean that no two sets of distinct parameters should be able to produce the same Σ matrix" (Wheaton, et al., 1977, p. 107).

The determination of identification for models that contain multiple indicators of true variables is particularly treacherous. Jöreskog and others (e.g., Jöreskog and Van Thillo, 1972) that work with systems of linear structural equations that involve multiple indicators of latent variables discuss the issue of identification in terms that are much different from the traditional discussions of identifiability in economics where there is usually no distinction between observed and true variables.**

One of the traditional conditions set forth for identifiability is the rank condition (Duncan, 1975, and Koopmans, 1949). The rank condition specifies that for each

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*The error variances for the single indicators of variables will not be estimated. The errors associated with these single indicators will be contained in the residuals of the single indicators true variables in the Psi matrix of the endogenous variables. If this procedure is not followed there are problems with the identification since one piece of information would be used to estimate two different parameters.

**See Koopmans, 1949, or Theil, 1971, for a more traditional discussion of this issue.

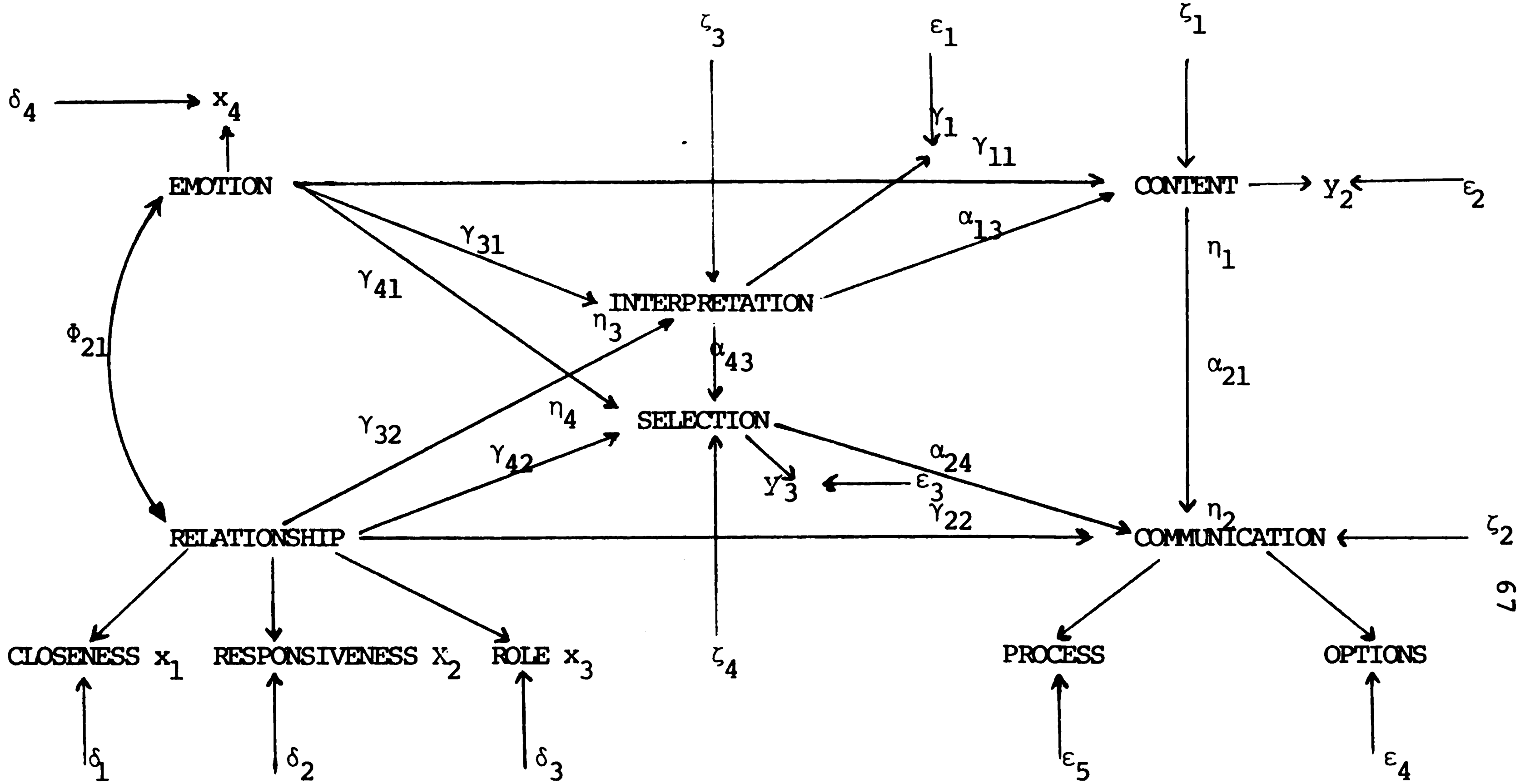

Figure 3. An Operational Model* of the Process of Social Interaction

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*Model II

equation in a model that the number of explanatory variables, those variables on which the dependent variable directly depends, must be less than or equal to the number of exogenous variables and variables that are predetermined with respect to that particular equation. This is a necessary condition for identification (Duncan, 1975), and it is satisfied for the relations between true variables in every model tested here.

Another necessary but not sufficient condition suggested for identifiability in the case of LISREL is the so called "counting rule" (Stein, 1976). This rule simply states that when the number of observed variables multiplied by one more than that number and that product is divided by two the result must exceed the number of parameters to be estimated. This condition is met for every model tested here.

Another definition of identifiability is suggested by Jöreskog for models tested using LISREL. He asserts that "if a parameter has the same value in all equivalent structures,* the parameter is said to be identified. If all parameters of the model are identified, the whole model is said to be identified" (Jöreskog and Van Thillo, 1972, p. 4). Models reported here have been subjected to this test. When

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* That is cases where different start values are set for the various parameters in the matrices.

different structures are specified (in terms of substantially different intitial values) and then tested the values of parameters of the models are identical.

Development of Final Radio Model

In this section the model proposed in Chapter I is going to be tested by means of LISREL in the radio situation, if the initial test results in a relatively high chi-square value and low associated probability level, additional parameters will be added to the model to determine if they result in significant drops in χ^2 relative to the degrees of freedom, an indication that the alternative model provides a better fit to the data (Jöreskog, 1974).

Comparing alternative versions of the same model is not always a clear cut process. Several factors must be taken into consideration in deciding which of several competing models is superior. The criteria that will be used in this section in selecting the model that will be tested in the television and typical situations are:

1. Parsimony. Only the minimum number of parameters should be estimated.

2. Consonance. The model should be as consonant as possible with the models and framework proposed in Chapter I.

3. The model should minimize the chi-square value relative to its degrees of freedom. A set of additional parameters should be added to the basic model only if they result in a considerable drop in the value of the chi-square

statistic. A small drop in the chi-square statistic when additional parameters are added indicates that these additional parameters contribute very little new information to the model (Jöreskog, 1974 and Schoenberg, 1972).

4. The model should minimize the residuals* remaining from subtracting the correlations generated by the model from the observed correlation matrix. After LISREL generates a solution it uses this solution to estimate the correlation matrix of the original variables given the estimates of the parameters and the structure of the tested model. The original correlation matrix is then subtracted from this matrix. The resulting residuals provide valuable indicators of weaknesses in a proposed model (Jöreskog and Van Thillo, 1972 and Schoenberg, 1972). High residuals can be used to indicate what paths should be added to a model and to indicate the general adequacy of a given model. A relatively high residual correlation would indicate that the model isn't predicting or accounting for the relationship between two observed variables (Costner and Schoenberg, 1973).

In the next section a final model of social interaction will be developed through applying the preceding

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*The residuals are determined by subtracting the correlation matrix, R, inputed into the program from the reconstructed matrix. The resulting matrix will be called the residual matrix here and its elements will be called residuals.

To prevent confusion the residuals associated with etas will be called zeta in the remainder of this dissertation.

criterion to alternative models.

Results of Tests of Models in Radio Situation

The results for Model Ia (the basic model proposed in Chapter I) with only the diagonal elements of the psi matrix estimated* are contained in Figure 4* and in Table 15. The ratio of the χ^2 value, 190.12, which reflects the overall goodness of the fit of the model to the data, to the degrees of freedom, 22, is 8.6 to 1.** The residual matrix contained in Table 15 indicates that high residuals are associated with the content indicant, y_2, and with the communication indicants, y_4 and y_5. This suggests that the addition of causal paths to these variables from the exogenous variables may reduce the size of these residuals and result in a significant drop in χ^2.

Figure 5 contains the results of Model IIa with paths from emotion to content and from relationship to communication. The substantive reasoning behind these paths was discussed in Chapter I. Only the on diagonal elements of the psi matrix are estimated in this model. With the loss of 2 degrees of freedom there was a substantial drop in the χ^2 value, 79.11, relative to Model Ia. The ratio of degrees of

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*Models with only the on diagonal elements of the matrix estimated will be identified by an a after the number.

**A ratio of 5 to 1 usually indicates that a model with appropriate modifications can provide a good fit to the data (Wheaton, et al., 1977).

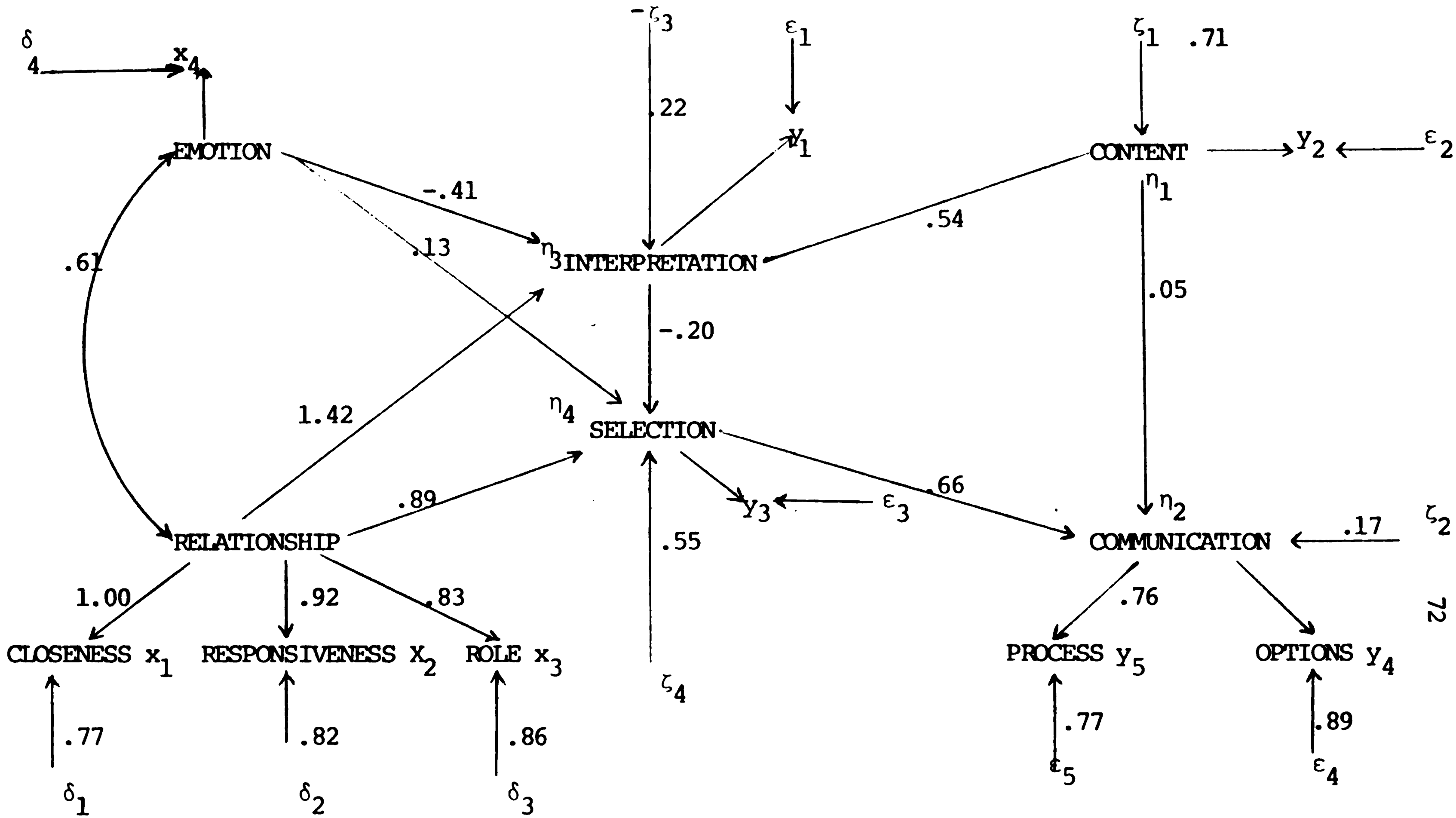

Figure 4. Results for Model Ia in Radio Situation

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*χ^2 = 190.12, df = 22, probability level = .0001
n = 88

Table 15

Residual Matrix for Model Ia
in Radio Situation

	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4
y_1	-.000								
y_2	.000	.000							
y_3	-.000	-.249	-.000						
y_4	-.173	-.061	-.022	-.018					
y_5	-.568	-.358	.009	-.014	-.010				
x_1	-.046	-.057	.018	-.234	-.418	-.000			
x_2	.109	-.291	-.055	-.187	-.250	-.010	.000		
x_3	-.060	-.195	.040	-.094	-.337	-.023	.051	.000	
x_4	.000	-.406	-.000	-.121	-.202	.074	-.154	.067	-.000

n = 88

freedom to the chi-squared value is 4 to 1. As would be expected with such a substantial drop in the χ^2 value there is a significant improvement in the residuals contained in Table 16. However, again high residuals are associated with the content indicators and the communication indicators.

Figure 6 contains the results of Model IIIa with paths from emotion to communication and from relationships to content. The addition of these two paths results in a loss of two degrees of freedom from the previous model. However, the χ^2 value only drops by 4.3 to 74.82. The ratio of the χ^2

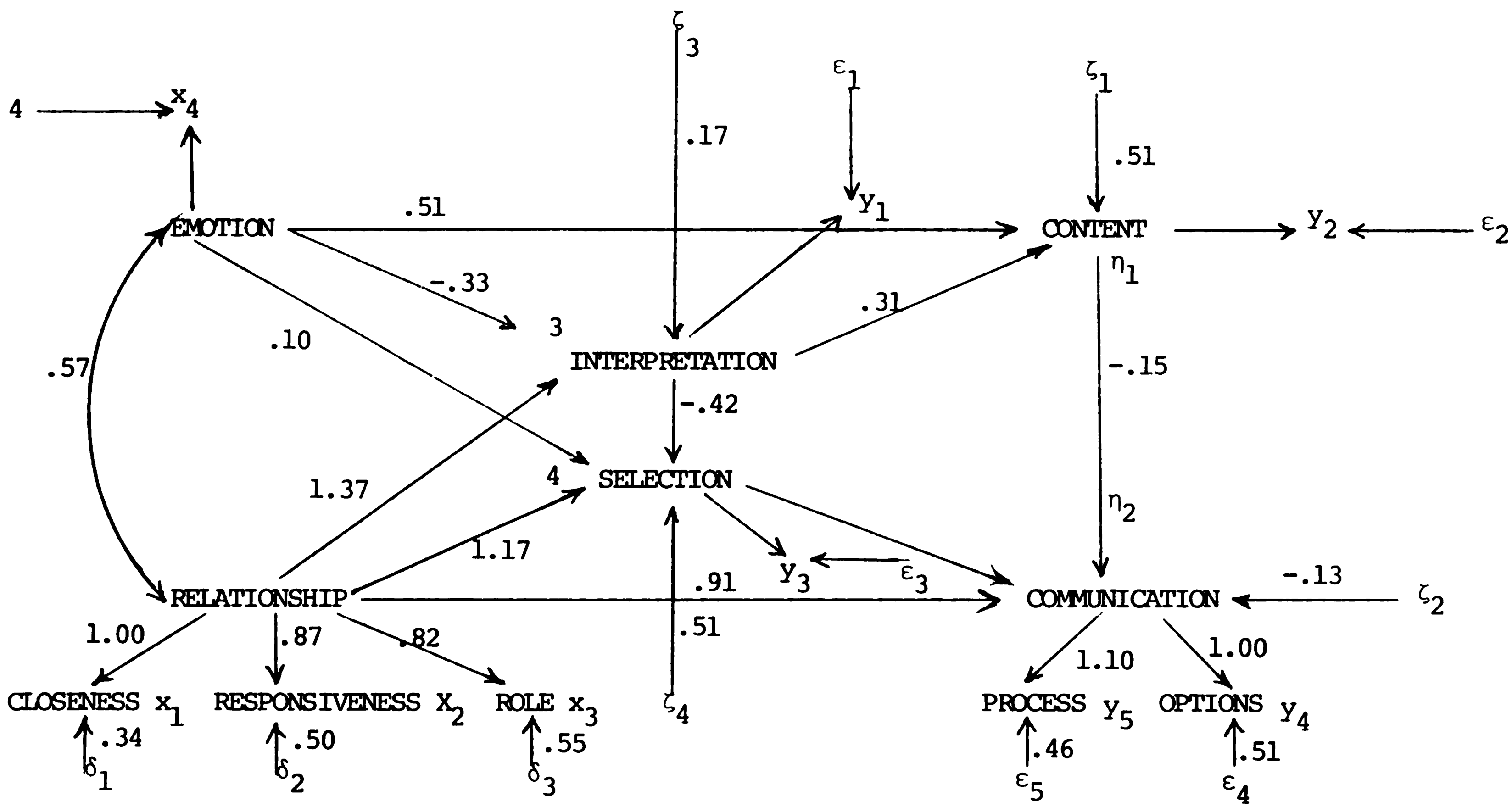

Figure 5. Results for Model IIa in Radio Situation with Paths Between Emotion and Content and Relationship and Communication and the Off-Diagonal Elements of Psi Matrix Fixed at Zero.*

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* 2 = 79.11, df = 20, probability level = .0001
n = 88

Table 16

Residual Matrix for Model IIa in Radio Situation with Paths Between Relationship-Communication and Emotion-Content with Psi Matrix Elements Off-Diagonal Fixed at Zero

	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4
y_1	-.000								
y_2	-.000	-.000							
y_3	-.000	-.060	-.000						
y_4	.129	.097	-.130	.006					
y_5	-.123	-.112	.116	.007	.008				
x_1	-.008	.090	.024	.002	-.035	.000			
x_2	.106	-.182	-.077	-.001	.067	-.035	-.000		
x_3	-.034	-.077	.041	.097	-.024	-.019	.027	-.000	
x_4	.000	-.000	-.000	-.011	.052	.041	-.214	.036	-.000

n = 88

value to degrees of freedom is 4.16 to 1. While some of the residuals in the previous matrix decreased, some of the other residuals increased.

Because of identification problems and theoretical constraints, this is the extent of the changes that can be made in the paths between the true variables. However, there are still substantial residuals contained in the model, especially involving communication, content, and the exogenous variables.

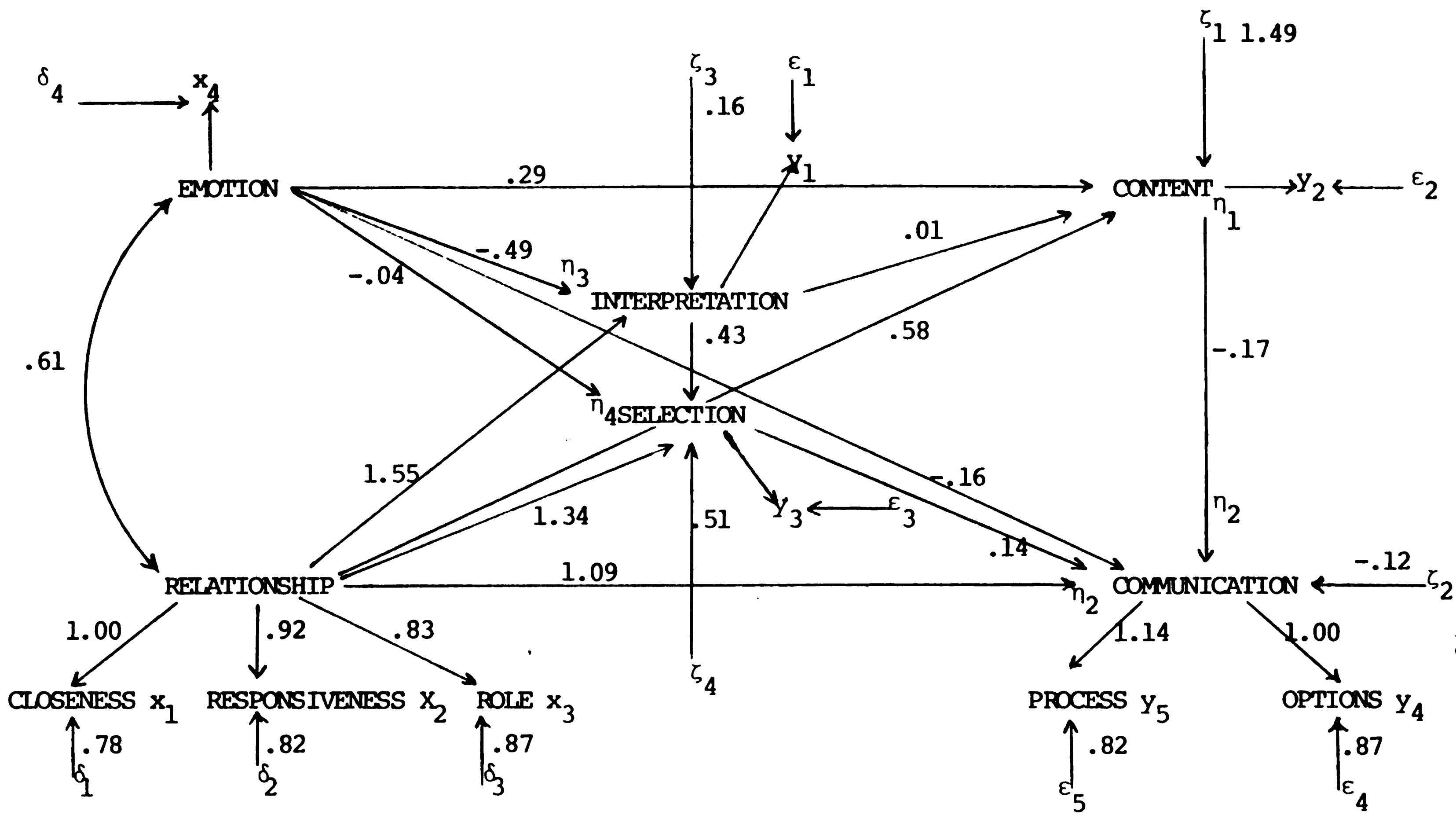

Figure 6. Results for Model IIIa in Radio Situation with Paths Between Surface and Underlying Variables and the Off-Diagonal Elements of Psi Matrix Fixed

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*χ^2 = 74.82, df = 18, probability level = .0001
n = 88

Table 17

Residual Matrix for Model IIIa in Radio Situation with Paths Between Each of the Underlying and Surface Variables and Off-Diagonal Elements of Psi Fixed at Zero

	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4
y_1	.000								
y_2	-.000	-.000							
y_3	.000	-.017	-.000						
y_4	.134	.112	-.152	.001					
y_5	-.095	-.082	.111	.001	.001				
x_1	-.045	.127	.021	-.030	-.051	.000			
x_2	.111	-.120	-.051	.002	.088	-.030	-.000		
x_3	-.057	-.040	.044	.076	-.030	-.040	.037	.000	
x_4	-.000	-.000	-.000	-.045	.031	.074	-.153	.069	-.000

n = 88

It is possible that if the covariances of the true endogenous variables are allowed to vary in the psi matrix that these residuals will be reduced enough to produce a substantially better fit of the model to the data. Regrettably this step involves the loss of 8 degrees of freedom. Each of the previous models will be reestimated with the only change being that all of the elements in the psi matrix will be estimated.*

*These models will be identified with a b after the number.

The LISREL run for Model Ib with the psi matrix left free to vary produces a not-positive definite matrix. This means that there was either an identification problem or that the determinant of the sigma matrix was too low to allow the program to calculate a solution for the model.

The results for Model IIb with the paths between emotion and content and relationships and communication and psi free are presented in Figure 7. The χ^2 value is 74.07 with 14 degrees of freedom. The ratio of χ^2 to degrees of freedom is 5.3 to 1. Again there is no clear improvement in the residuals, see Table 18, compared to the other models.

Table 18

Residual Matrix for Model IIb in Radio Situation with Paths Between Relationship - Communication and Emotion-Content with Psi Matrix Estimated

	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4
y_1	-.000								
y_2	-.000	-.000							
y_3	-.000	-.000	-.000						
y_4	.134	.113	-.157	.000					
y_5	-.091	-.077	.107	.000	-.000				
x_1	-.041	.118	.020	-.028	-.046	.000			
x_2	.106	-.135	-.058	-.004	.085	-.009	.000		
x_3	-.061	-.053	.038	.072	-.032	-.021	.048	-.000	
x_4	-.000	-.000	-.000	-.047	.032	.075	-.159	.064	.000

n = 88

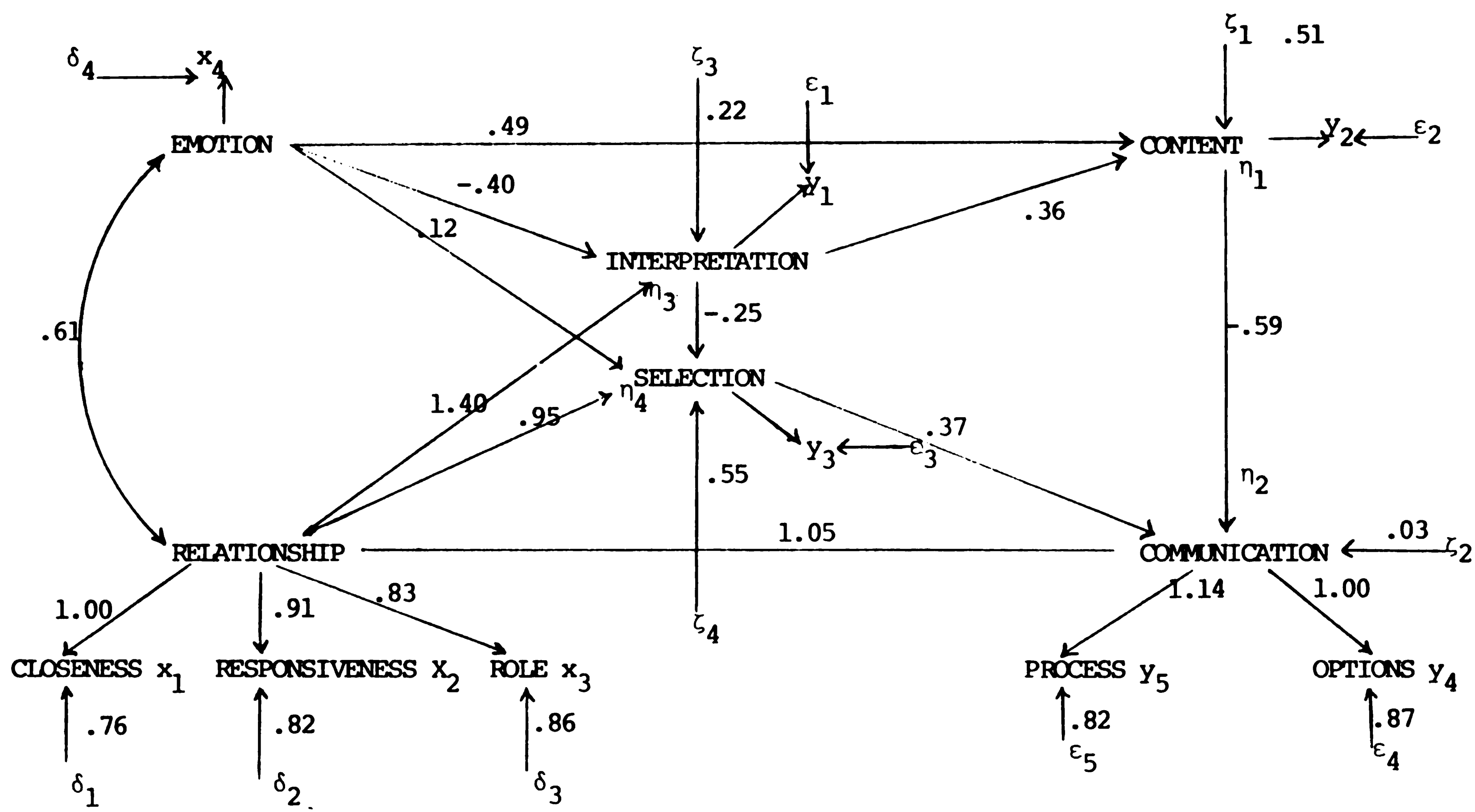

Figure 7. Results for Model IIb in Radio Situation with Path Between Emotion and Content and Relationship and Communication and Off-Diagonal Elements of Psi Matrix Estimated.

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*χ^2 = 74.07, df = 14, probability level = .0001
n = 88

Table 19 contains the zeta covariances, only the one between content and meaning, .21, is substantial.

Table 19

Psi Matrix for Model IIb in Radio Situation with Paths Between Relationship-Communication and Emotion-Content

	ζ_1	ζ_2	ζ_3	ζ_4
ξ_1	.51			
ξ_2	.21	.03		
ξ_3	-.04	.07	.22	
ξ_4	.04	-.08	.01	.55

Figure 8 contains the last possible model (since there are no theoretically or technically acceptable possibilities remaining) with paths between all the exogenous variables and all of the endogenous variables. The χ^2 value is 74.07 for Model IIIb with 12 degrees of freedom. The ratio of the χ^2 value to the degrees of freedom is 6.17 to 1. Again the zeta covariances, contained in Table 20, reveal no clear improvement over the models with additional paths.

<u>Comparison of the Radio Models</u>

It should be clear that the "best" radio model is Model IIa with paths between emotions and content and between relationships and communication where only the on diagonal elements of psi are estimated. Except for the Model Ia, this

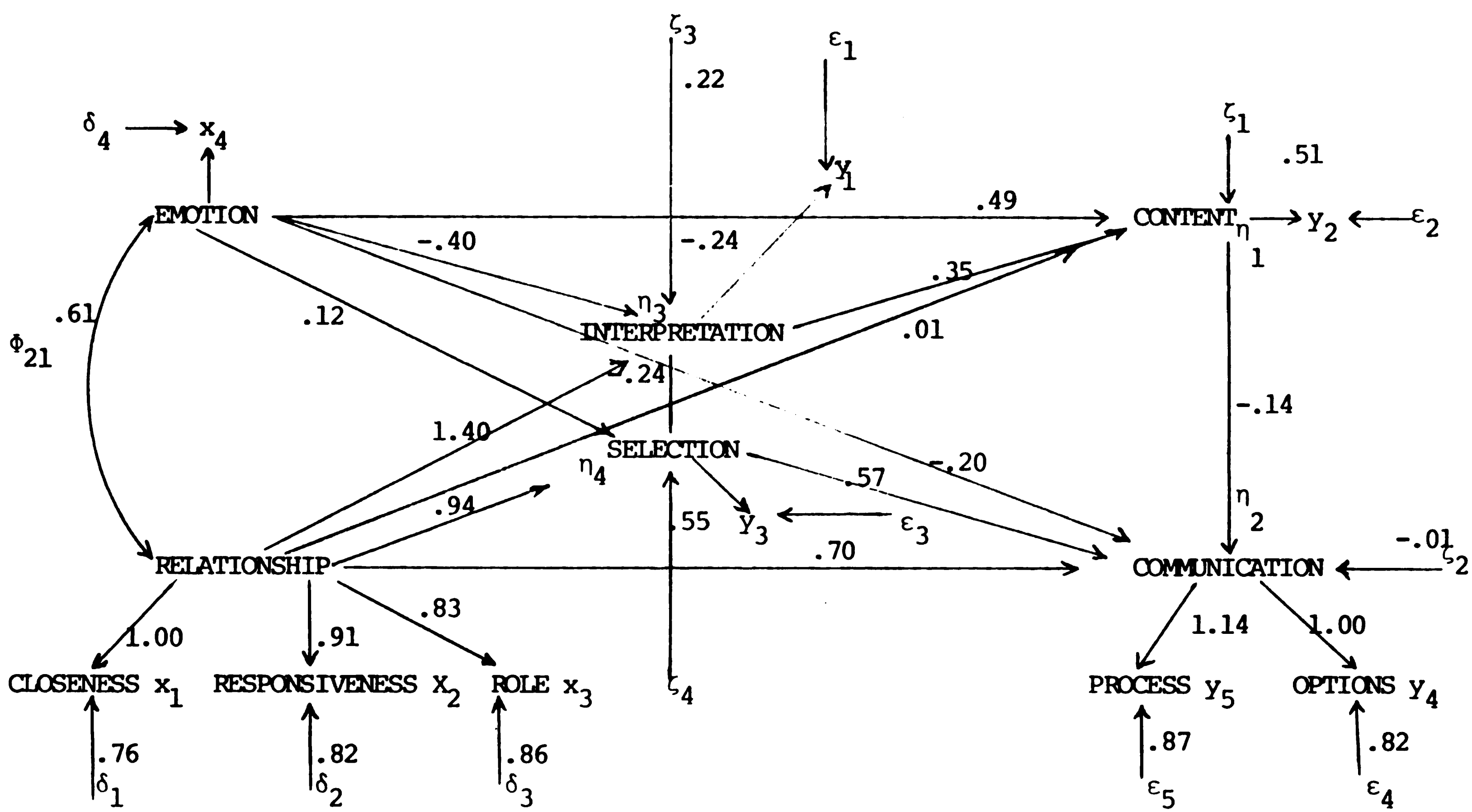

Figure 8. Results for Model IIIb in Radio Situation with Paths Between the Underlying and Surface Variables and the Psi Matrix Estimated*

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*χ^2 = 74.07, df = 12, probability level = .0001
n = 88

Table 20

Residual Matrix for Model IIIb in Radio Situation with Paths Between Each Underlying Variable and Each Surface Variable with Psi Matrix Estimated

	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4
y_1	-.000								
y_2	-.000	.000							
y_3	-.000	.000	-.000						
y_4	.134	.113	-.157	.000					
y_5	-.091	-.077	.107	.000	-.000				
x_1	-.041	.118	.020	-.028	-.046	.000			
x_2	.106	-.135	-.058	-.004	.085	-.009	.000		
x_3	-.061	-.053	.038	.072	-.032	-.021	.048	-.000	
x_4	.000	.000	.000	-.047	.032	.075	-.159	.064	.000

n = 88

Table 21

Psi Matrix for Model IIIb in Radio Situation with Paths Between Each Underlying Variable and Each Surface Variable

	ζ_1	ζ_2	ζ_3	ζ_4
ζ_1	.51			
ζ_2	-.03	-.01		
ζ_3	-.04	.06	.22	
ζ_4	.04	-.21	.01	.55

is the most parsimonious model. This model produces residuals that are much lower than those of the Model Ia, and that are equivalent to the residual matrices of the other alternatives. Model IIa also has the best ratio of the chi-square statistic to degrees of freedom.

The differences between the chi-square values of differing models can also be evaluated by a relatively simple statistic that allows us to determine which of two competing models is superior. The difference in the chi-square estimates for two competing models is asymptotically a chi-square whose degrees of freedom are equal to the corresponding differences in degrees of freedom (Jöreskog, 1977, and Wheaton, _et al._, 1977). Table 22 presents the results of this test for both the differences between the Model Ia and alternative models, and Model IIa and alternative models. The differences between Model Ia and the other models are significant at the .01 level (χ^2_{10} > 29.59 at .01 level). The differences between the Model IIa and the other models, aside from the Model Ia, are not significant at the .05 level χ^2_2 .05 > 5.99, indicating that the additional parameters estimated by the program in these other models do not significantly improve the fit of the model to the data.

Before Model IIa is tested in the other situations the estimates of its parameters in the radio situation will be discussed in more detail. For comparison the basic theoretical model (Model I) proposed in Chapter I will also be tested in

Table 22

Comparison of χ^2 Values for Radio Models

A) Differences Between Model IIa and Other Radio Models

MODEL	STATISTICS
1. Model IIa with Paths Between Emotion and Content and Relationships and Communication with Off-Diagonal Elements of Psi Fixed at Zero	$\chi^2_{22} - \chi^2_{20} = \chi^2_{2}$ 190.12 - 79.11 = 111.01
2. Model IIIa with Paths Between all of the Underlying and Surface Variables and Off-Diagonal Elements of Psi Matrix Fixed at Zero	$\chi^2_{22} - \chi^2_{18} = \chi^2_{4}$ 190.12 - 74.82 = 115.30
3. Model IIb with Paths Between Emotion and Content and Relationships and Communication with Off-Diagonal Elements of Psi Matrix Estimated	$\chi^2_{22} - \chi^2_{14} = \chi^2_{8}$ 190.12 - 74.07 = 116.05
4. Model IIIb with Paths Between all of the Surface and Underlying Variables and Off-Diagonal Elements of Psi Matrix Estimated	$\chi^2_{22} - \chi^2_{12} = \chi^2_{10}$ 190.12 - 74.07 = 116.05

B) Differences Between Model IIa with Paths Between Emotion and Content and Relationships and Communication with Off-Diagonal Elements of Psi Fixed at Zero and the Other Radio Models

MODEL	
1. Model IIIa with Paths Between all of the Underlying and Surface Variables and Off-Diagonal Elements of Psi Matrix Fixed at Zero	$\chi^2_{20} - \chi^2_{18} = \chi^2_{2}$ 79.11 - 74.82 = 4.29
2. Model IIb with Paths Between Emotion and Content and Relationships and Communication with Off-Diagonal Elements of Psi Matrix Estimated	$\chi^2_{20} - \chi^2_{14} = \chi^2_{6}$ 79.11 - 74.07 = 5.04
3. Model IIIb with Paths Between all of the Surface and Underlying Variables and Off-Diagonal Elements of Psi Matrix Estimated	$\chi^2_{20} - \chi^2_{12} = \chi^2_{8}$ 79.11 - 74.07 = 5.04

the TV and typical situations. However, the results of these tests won't be discussed; instead they are presented in Appendix F.

Results of Finally Chosen Radio Model

Now that a final model has been selected, its results will be discussed in more detail. The results are reported in Figure 5 and in Table 16. All values of parameters reported here are based on the maximum likelihood solution reported by LISREL. The paths between true variables are all substantial in the model. One of the applications of path analysis is a process termed "theory trimming." In this process paths that are considered not to be meaningful are dropped from a model. Land (1969) recommends that paths less than .05 be treated as not meaningful. All of the paths here are greater than .1, so applying Land's criterion all of these paths are meaningful. However, three of the paths fall in the .10 to .15 range--emotion to selection, selection to communication, and content to communication--and could be seen as only contributing marginally to the model. The remainder of the true paths in the model are apparently major determinants of their dependent variables.

In all cases the variances of the errors in measurement are substantial with values ranging from .34 to .56.

The zeta variance for interpretation is .17; for content .51; and for selection .51.* The zeta variance for communication is a -.12.

The scale factors for the ordinary indicators are all greater than .82.

The residual matrix for the radio model is contained in Table 16. As noted before substantial residuals are associated with the content indicant and the two communication indicants. One exception is the relatively high residual between responsiveness and emotion -.21.

The probability level associated with this model is less than .0001.** In this dissertation probability levels less than .05 will be considered to indicate the model provides a worse fit of the model to the data than would be expected by chance. Thus the model does not provide a good fit to the data. The chi-square value of this model was 79.11 and the degrees of freedom were 20 for a ratio of about 4 to 1.

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*These zeta variances include errors of measurement. Given the substantial errors in measurement associated with the multiple indicators it must be assumed that the zeta variances for these variables are higher than they would be if they had had multiple indicators.

**Remember the probability level associated with the LISREL χ^2 value is the probability of getting a chi-square larger than the one generated by the model, given the hypothesis that the model is true. As a result probability levels approaching 1.0 are indicants of better fits of the model to the data for they indicate that the fit is better than chance given n cases (Jöreskog and Van Thillo, 1972).

Results for the TV Model

The results for Model IIa in the TV situation are contained in Figure 9 and Table 23. None of the substantive paths should be trimmed from this model, although the one between emotion and interpretation approaches Land's criterion. Four other paths appear to contribute only marginally in determining their dependent variables: emotion and content, .16; content and communication -.16; selection and communication -.19; and emotion and selection -.12. The rest of the paths between the true variables appear to contribute substantially to the variance in their dependent variables.

Table 23

Residual Matrix for Model IIa in TV Situation

	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4
y_1	-.000								
y_2	-.000	-.000							
y_3	.000	-.270	-.000						
y_4	.013	-.088	.042	.027					
y_5	.104	-.065	.049	.018	.011				
x_1	.019	-.154	.004	-.035	.129				
x_2	.000	-.167	-.067	.029	.021	.063	-.000		
x_3	-.105	-.140	.108	.061	.334	.022	.024	-.000	
x_4	-.000	-.000	-.000	.083	.244	.007	-.066	-.174	-.000

n = 93

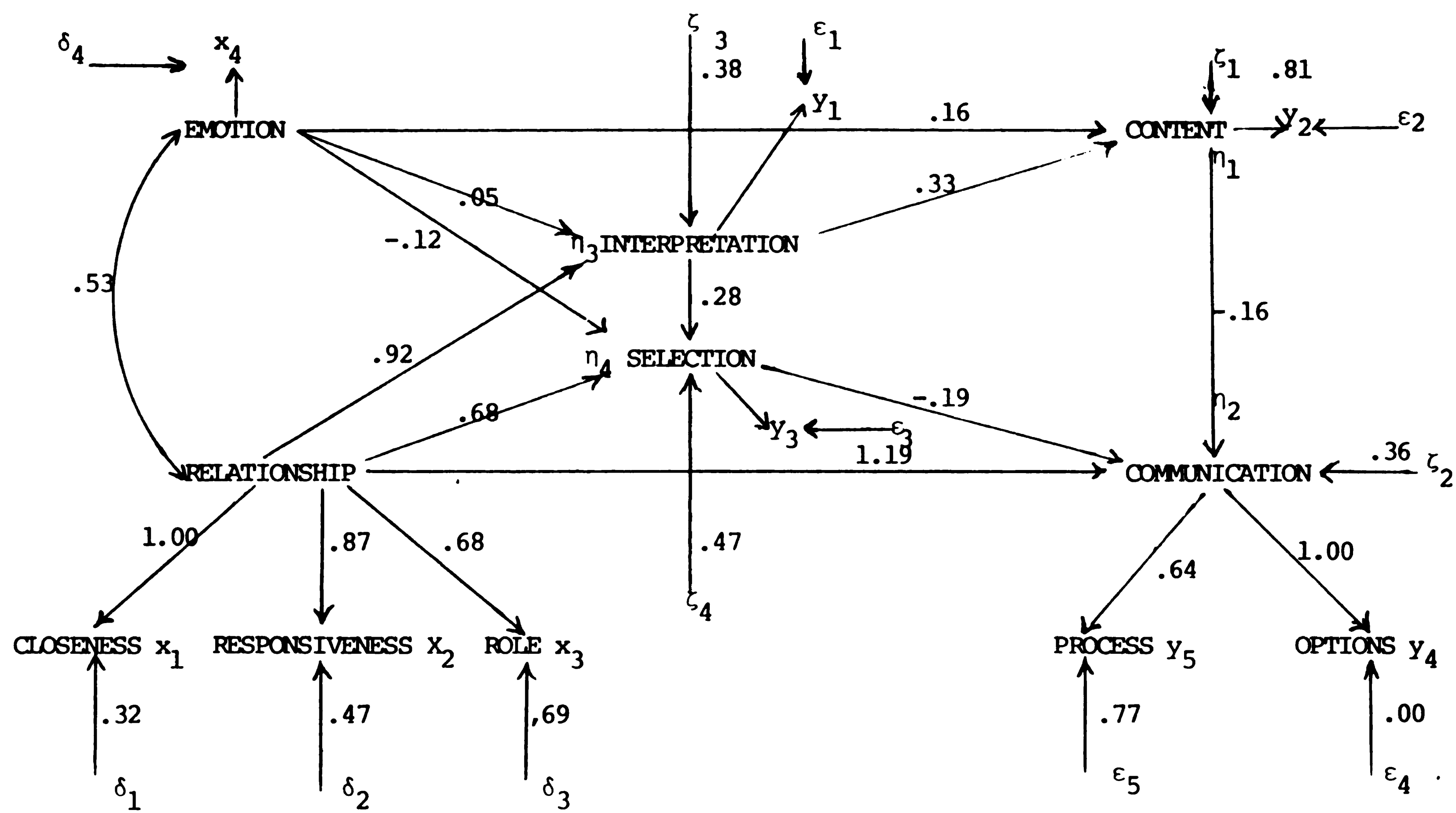

Figure 9. Results for Model IIa in TV Situation

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* $\chi^2 = 84.91$, df = 20, probability level = .0001
n = 93

Except for conversation options,* all the variances of the errors of measurement are substantial ranging from .32 to .77.

The zeta variances of the true variables that have only one indicator are all substantial ranging from .38 for interpretation to .81 for content. The zeta variance for communication is .36.

The scale factors of the ordinary indicators range from .64 to .87.

The residual matrix of the TV model is contained in Table 23. The high residuals are usually associated with the content and communication indicants. However, there is a high residual between role and interpretation (-.105) and between role and emotion (-.174).

The chi-square value for this model is 84.91, with 20 degrees of freedom. The ratio of chi-square to the degrees of freedom is 4.25 to 1. The probability level is less than .0001, indicating that Model IIa does not provide a good fit to the data in the TV situation.

Results for Model IIa in the Typical Situation

The determinent of the correlation matrix for the typical situation dictated some changes in Model IIa. The

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*Conversation option's measurement error variance had a value of .00. This is sometimes indicative of an estimation problem in the program. This model was run again with this value fixed at .0. This procedure produced identical estimates.

LISREL program will not function when a beta matrix or reconstructed $\hat{\Sigma}$ matrix is singular. If R (the correlation matrix) and the model reflect an approximately correct model and are nonsingular, then $\hat{\Sigma}$ will also tend to be nonsingular, thus one indicant of possible problems, when the model is correctly specified, is a singular correlation matrix (one that has a low determinant). A low determinant in a matrix is an indication of a high degree of linear dependence between one or more variables. Another word for this linear dependence is multicollinearity. Now a certain amount of multicollinearity can be expected in a correlation matrix composed of variables in the same causal model, some of which may be indicants of the same true variable. However, in this instance, in all of the correlation matrices, there is almost perfect linear dependence among some subset of the variables. Table 24 contains the determinants for the correlation matrices, there is almost perfect linear dependence among some subset of the variables. Table 24 contains the determinants for the correlation matrices tested in this dissertation. The television situation correlation matrix has a determinant of .0080 and the radio situation has a determinant of .0023. While these determinants are very low they are sufficient for the LISREL program to function. The determinant for the correlation matrix in the typical situation, however, is so low, .0004, that the program won't

Table 24

Determinants of Correlation Matrices

Correlation Matrix	Determinants
Television Situation	.0080
Radio Situation	.0023
Typical Situation	.0004
For Typical Situation with the Following Variables Deleted:	
Content	.0006
Meaning	.0022
Emotion	.0010
Process of Conversation	.0012
Conversation Options	.0036
Selection	.0008
Closeness	.0028
Responsiveness	.0010
Role	.0019
Role, Responsiveness, and Closeness	.0082
For the question with the Following Combinations of Variables, treated as indices in the correlation matrice:	
Closeness, Responsiveness, and Role	.0047
Closeness and Responsiveness	.0011
Role and Closeness	.0016
Role and Responsiveness	.0009
Process of Conversation and Conversation Options	.0011

function* with it.**

Two strategies exist for correcting this problem: (1) deletion of one or more true variables and (2) deletion of multiple indicants of a true variable. These strategies allow for the testing of the model, but they have the disadvantage of limiting the comparability of models. The results in Table 24 indicate the highest determinant resulted from converting the individual indicants of relationship into an index created by summing its three indicants. This correlation matrix is the one that will be used to test the model in the typical situation.

Table 24 also contains the determinants that result from removing the single indicants of the other true variables. While all of these determinants were greater than the determinants for the complete correlation matrix, none was sufficiently high to justify excluding a true variable from the model or was preferable to the relationship index.

The problems with the determinant which necessitated the substitution of an index for the relationship indicants

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*One reason for the failure of the program in this case is the higher correlations between variables in this situation. A simple correlation greater than .80 has been deemed sufficient to produce an unacceptable degree of multicollinearity (Rockwell, 1975). There are 5 simple correlations in the typical model that exceed .80. No simple correlation in the television matrix exceeds .80; and only one correlation in the radio matrix exceeds .80.

**Most multiple regression estimates require inversion of a correlation or covariance matrix; a singular matrix (one with a low determinant) cannot be inverted (Rockwell, 1975).

produced some slight modifications of the lambda x matrix and of the theta delta matrix. These changes are reflected in Figure 10 which reports the results of the model and in Table 25 which contains the residual matrix.

Following Land's criterion the path between content and communication should be dropped from this model. The paths between emotion and interpretation, -.09; interpretation and content,-.14; relationships and selection, -.14; and selection and communication, -.16, also appear to contribute only marginally to this model. The rest of the paths all appear to contribute substantially to the variation in their dependent variables.

The errors of measurement variances were .41 for the process of conversation and .14 for the conversation options indicants of communication.

The zeta variances ranged from .13 for communication to .69 for content.

The scale factor of process of conversation was .81.

The residuals are substantial for content and conversation options, -.119; interpretation and selection -.119; process of conversation and interpretation, -.087; and selection, -.101; and relationships and process of conversing, -.194.

The chi-square value for this model is 55.75 with 8 degrees of freedom. The ratio of chi-square to degrees of freedom is 7 to 1. The probability level does not provide a good fit to the data.

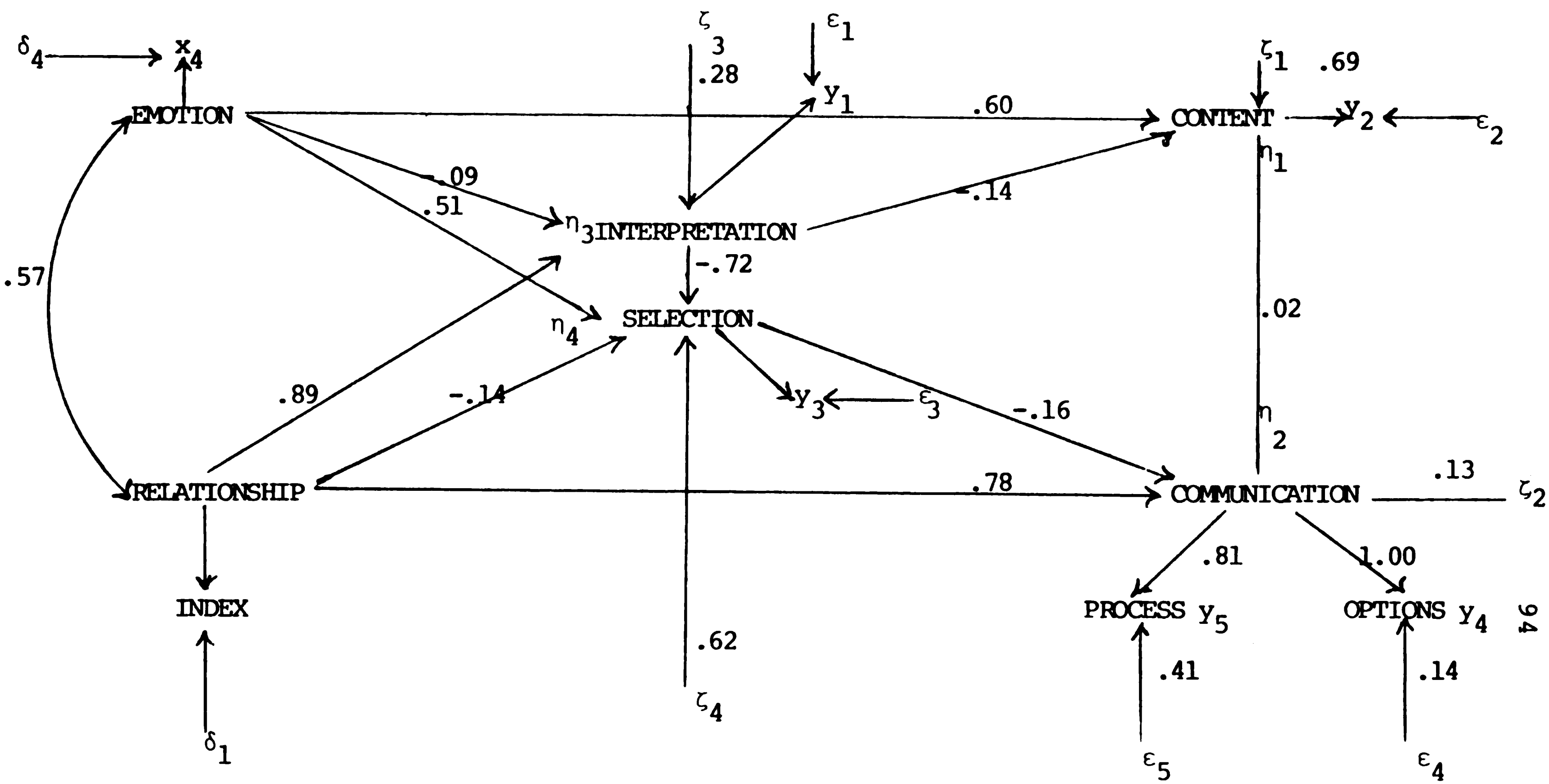

Figure 10. Results for Model II a in Typical Situation*

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*$\chi^2 = 55.75$, df = 8, probability level = .0001
n = 79

Table 25

Residual Matrix for Model IIIa in Typical Situation

	y_1	y_2	y_3	y_4	y_5	x_1	x_2
y_1	-.000						
y_2	.000	.000					
y_3	-.067	-.119	-.004				
y_4	-.119	.116	.033	.019			
y_5	-.087	-.044	-.101	.036	.001		
x_1	-.000	.036	.001	.012	-.044	-.000	
x_2	-.000	.000	-.024	.000	-.194	-.000	-.000

n = 79

Comparison of the Results of the Tests of the Model

The chi-square values (see Table 26) indicate that all three of the models have a similar fit to the data. The chi-square value for Model IIa in the typical situation is approximately the same as that for radio and TV when the loss of degrees of freedom for the relationships index is taken into consideration. The degrees of freedom ratios for the tests in all three situations indicate that the models, while none of them are significant at the .05 level, Model IIa could be at least approximately correct. While these tests are disappointing, in that they provide no conclusive evidence that this model is a good fit to the data, this disappointment is ameliorated somewhat by the realization that Jöreskog (1974) has indicated that the chi-square test is often misleading in this regard and is really better suited for comparing models.

Table 26

Goodness of Fit of Model IIa
in the Three Situations+

	χ^2	Degrees of Freedom	Ratio
Radio Situation	79.11	20	4.0
TV Situation	84.91	20	4.2
Typical Situation*	55.75	8	7.0

*Fewer degrees of freedom because of relationships index.
+All of the tests of the model had a probability level less than .0000.

Table 27 compares the values of the true paths between the exogenous true variables and the endogenous true variables. There is not a great deal of similarity in the value of these paths from situation to situation. Only the γ_{32}, γ_{22}, and γ_{31} paths exhibit much stability. The γ_{32} path between relationships and interpretation is always greater than .89,* indicating that relationships have a substantial effect on interpretations. The γ_{22} path between relationships

*Following Fink and Mabee (1977) at least two interpretations of coefficients absolutely greater than 1 are possible. One, when sampling error is absent values greater than 1 indicate that the rank of the correlation matrix imposed by the model is too low for the empirical correlations. Thus solutions absolutely greater than 1 may indicate that there is specification error. Two, a state of disequilibrium could exist among variables in some cross-sectional units.

Table 27

Values of Paths Between Exogenous and Endogenous Variables in the Three Situations

	Radio	TV	Typical
γ_{31}	-.33	.05	-.09
γ_{41}	.10	-.12	.51
γ_{32}	1.37	.92	.89
γ_{42}	1.17	.68	-.14
γ_{11}	.51	.16	.60
γ_{22}	.90	1.19	.78

and communication is always greater than .78 indicating that relationships are powerful determinants of communication. The γ_{31} path varies from -.33 for radio to .05 for TV.

Table 28 compares the values of the paths between the endogenous variables across all of the models. α_{21}, between content and communication, and α_{24}, between selection and communication, have an absolute magnitude less than .2, which indicates a relatively low causal relationship between these variables. The α_{13} and α_{43} paths do not exhibit much stability.

The zeta variances are contained in Table 29. The greatest stability in zeta variances across all of the variables is exhibited by interpretation (.17 to .38) and selection (.47 to .62).

Table 28

Values of Paths Between Endogenous Variables in the Three Situations

	Radio	TV	Typical
α_{13}	.31	.33	-.14
α_{21}	-.15	-.16	.02
α_{24}	.15	-.19	-.16
α_{43}	-.42	.28	-.72

Table 29

Zeta Variances for the True Variables in the Three Situations

	Radio	TV	Typical
Endogenous			
Content	.51	.81	.69
Communication	-.12	.36	.13
Interpretation	.17	.38	.28
Selection	.51	.47	.62

The scale factors for the ordinary variables are contained in Table 30. The responsiveness value is the same in both the radio and TV situation, .87, the role scale factors differ moderately and the scale factors for process of conversation differ substantially.

Table 30

Scale Values for Ordinary Indicators in the Three Situations

	Radio	TV	Typical
Process	1.10	.64	.81
Responsiveness	.87	.87	*
Role	.82	.68	*

*Note: No values because of index used for relationship variables.

The measurement error variances associated with the multiple indicators are contained in Table 31. The measurement error variance of the relationship indicators range from .32 to .69. The measurement error variances of the communication variables are more unstable ranging from .00 to .77.

Table 31

Measurement Error Variances for Multiple Indicators in the Three Situations

	Radio	TV	Typical
Process	.46	.77	.41
Options	.56	.00	.14
Closeness	.34	.32	*
Responsiveness	.50	.47	*
Role	.55	.69	*

*Note: No values because of index used for relationship variables.

Tables 16, 23, and 25 contain the residual matrices for the radio, TV, and the typical situations tests respectively. Arbitrarily it could be said that when the residuals for the simple correlations between two observed variables is greater than -.05 in all three situations the relationship between those two variables is not satisfactorily explained by the current model. This condition holds true only for the residual between selection and content.*

Conclusion

In this section the results of the tests of the models of the process of social interaction in three situations--television, radio, and typical--were presented. First, the means, the standard deviations, and the correlation matrices were presented. Then, to assess the significance of and the variance accounted for by the effects of the respective independent variables on the respective dependent variables, OLS multiple regressions were used. The tests of the overall goodness of fit of the model was made by means of the LISREL computer program, which has a number of advantages over

---

*This path was added to the TV model and tested. The χ^2 value, with 19 degrees of freedom, was 68.16. This path reduces the residual to 0. The ratio of χ^2 to degrees of freedom was 3.6 to 1; an improvement over the 4.25 to 1 of the "best" model, but still far from the ratio that would result in a significant χ^2, and not enough to warrant disturbing the theoretical symmetry of the model. The next chapter will suggest alternative, and probably superior, improvements in the model other than the addition of this path.

multiple regression. The radio situation was used to refine the model developed in Chapter I; this model was then tested in the television and typical situations. This chapter concluded with a comparison of the results of the models.

In the following chapter the results of this model will be discussed on a substantive and methodological level. First, methodological explanations of the results which suggest modifications in the LISREL model will be discussed. This modified model will be tested and then compared to the results presented here. The substantive explanations for the results of the models will then be discussed. The dissertation will conclude with Chapter V which will discuss the implications of the tests of the model and suggestions for future research.

CHAPTER IV

DISCUSSION OF THE RESULTS AND TESTS OF A MODIFIED MODEL

There are two primary kinds of explanations for the results presented in Chapter III: methodological explanations and substantive explanations. This chapter will focus primarily on the former, the latter will be discussed in some detail in Chapter V. There are three primary methodological explanations of the results: the high zeta variances of the true variates; the high levels of measurement error variances associated with the multiple indicators; and the high levels of multicollinearity. These explanations will be discussed in some detail initially in this chapter, then a new LISREL model will be proposed that ameliorates some of these problems. After the results of the tests of this model are reported for each of the situations they will be compared to each other and to the tests of Model IIa presented in Chapter III. The chapter will conclude with a discussion of the role of unspecified factors in the results.

Methodological Explanations of the Results

The results reported in the previous chapter reveal that there is a moderately high level of measurement error variance associated with multiple indicators of true variables.

This indicates that there is an imperfect association between the indicators chosen here and the true variables they represent. This imperfect association is at least partially responsible for the poor fit of the model to the data and perhaps related to the instability of parameters across situations.

The zeta variances, especially those found in the television situation, and those for content and selection generally, indicate a considerable proportion of the variation in the true variables is caused by factors not included in Model IIa. Again this is probably related to the poor fit of the model to the data and the instability of parameters across situations.

The overall results of the models, which were quite consistent, and the quite different estimates of the parameters in the models, reveal a pattern similar to the recognized effects of multicollinearity.* That is multicollinearity

---

*In general, while multicollinearity affects the estimates of particular variables, it doesn't have an effect on the overall level of significance or variance accounted for by all of the independent variables (Rockwell, 1975). When multicollinearity is present there is a very high standard error associated with the estimate of any one parameter in the model (Rockwell, 1975, and Klein and Nakamura, 1962). In effect when there is a high level of multicollinearity a researcher is unable to distinguish the effects of any particular independent variable on a dependent variable (Theil, 1971, and Althauser, 1971).

Wiley (1973) has indicated that a singular matrix in a LISREL model has many analogues to the problems of multicollinearity in traditional multiple regression techniques. When Σ is singular the derivatives used to calculate the usually doesn't affect the overall test of a model, but it does have a considerable effect on the precision with which any one parameter can be estimated. This coupled with the low determinants of the correlation matrices indicate that there is a very real possibility that multicollinearity may have affected the results.

Modified LISREL Model

In this section a modified LISREL model will be proposed that overcomes some of the methodological problems found in Model IIa tested in Chapter III. One of the unique advantages of LISREL is that it allows the researcher to assess the impact of an unobservable variable. This variable can be one for which there are no direct or unique indicants. In this case all of the observed variables will be made indicants of common, unobserved variables. As a result this model (Model IV) contains a new η and ξ that represent a common factor at both the exogenous and the endogenous levels. In effect all of the observed endogenous variables are, in addition to being determined by their associated true variables, determined by a common variable. Thus in lambda_x and lambda_y new parameters are estimated for each observed variable to determine

---

maximum likelihood function become suspect. The presence of collinearity between the exogenous variables, which is evidenced by the high covariance between them, can cause special problems in the identification of parameters within the model (Wiley, 1973). As a result of possible problems with multicollinearity the estimates of the values of parameters in the models tested in Chapter III must be viewed with extreme caution.

the effect of the common factors upon it.*

There are no changes in the beta structure estimated in this new model, although a new row and column representing the common endogenous variable is added to the matrix.

The common exogenous variable is said to cause the common endogenous variable, the path between them, y_{33}, is fixed at one.

The variance of the exogenous variable is fixed at one.

The residual of the common endogenous variable is fixed at zero.

The thetas remain as before.

The effect of these changes in the model is to isolate those common sources of variation in the estimations of the parameters in the model and to allow for the true relationships between the other variables in the model to be estimated more accurately. This is done by allowing the observable variables to be determined by both their unique true variables, for which they are indicators, and to allow them to also be determined by another true variable, which they all share in

---

*Because of the unique nature of the common variable, causing as it does in this model all of the observed indicants; because the other observed indicators are often reference indicators of other true variables; because reference and ordinary indicators are usually associated with a clearly defined true variable with which they have a strong conceptual tie; and because of the arbitrariness (and unknown implications) of choosing a reference indicator among the indicators of the common variable it was decided to make all of its indicators ordinary indicators.

common, which can represent the common sources of variation in the model. These changes should allow a more accurate assessment of the goodness of fit of the model by removing the "noise" attributable to common factors.

Results of Model IV with the Common Variable in the TV Situation

Since the only changes in the parameters to be estimated in the Model IV is in the lambda matrices, the presentation of results here will be in the same format as Chapter III. The lambda factors for the common values will be presented in column vectors in a separate table. Remember that there is a path with a fixed value of 1 between the common variables, and the phi and psi values of these two variables are fixed at 1.0 and 0 respectively in all the models. For simplicity these parameters and paths aren't included in the figures.

The parameters for Model IV in the television situation are contained in Figure 11. The paths between the true variables in this model are substantial, ranging from .34 for the path between interpretation and content to 2.79 for the path between relationships and communication.

Except for conversation options (.00),* the variances of the errors of measurement of the multiple indicators are considerable with values ranging from .42 for closeness to .55 for role.

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*This value was fixed at .0 in another run which resulted in identical values for the other parameters.

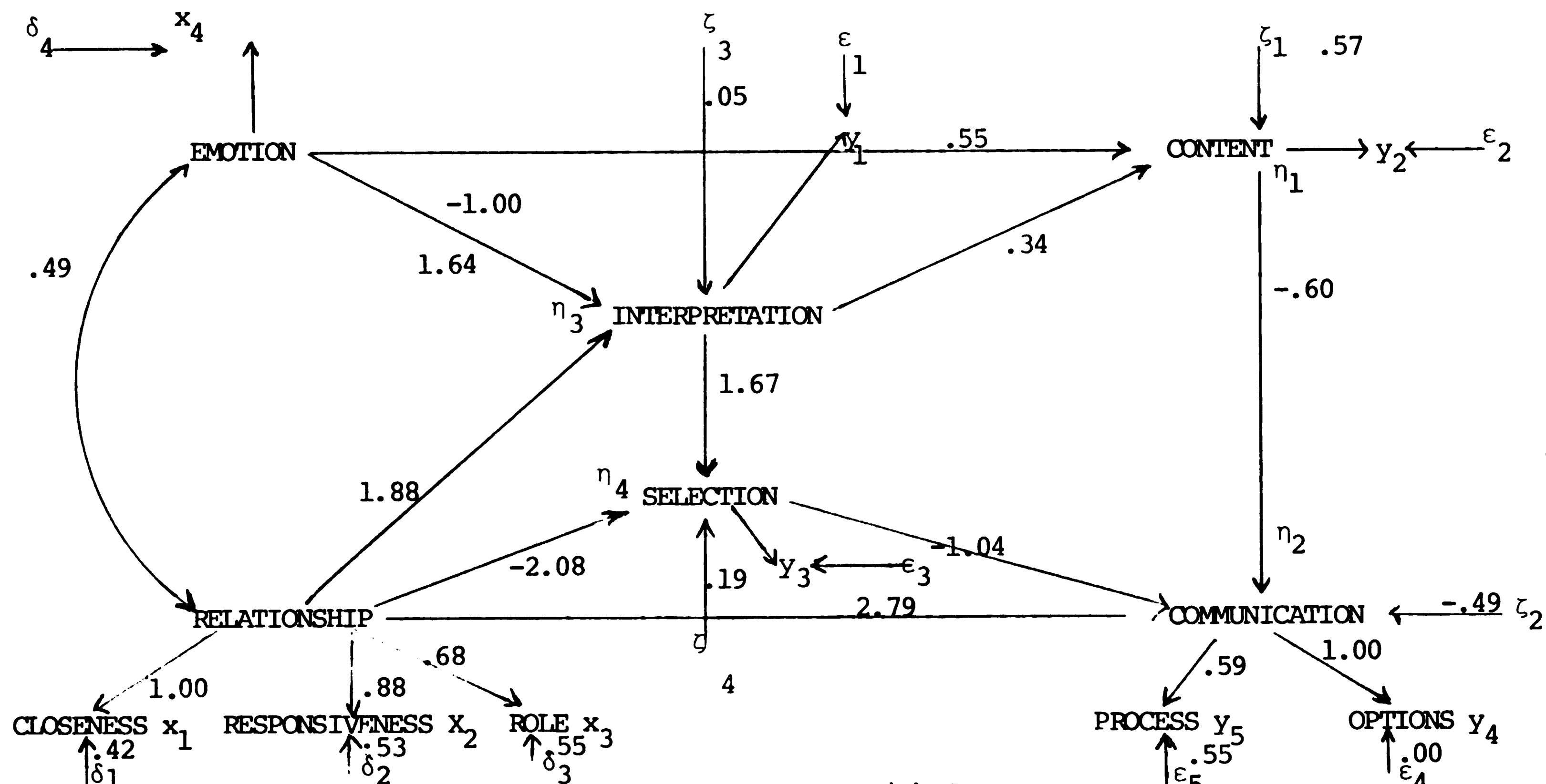

Figure 11. Results for Model IV in TV Situation with Common Variable*

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* χ^2 = 28.49, df = 11, probability level = .0027
n = 93

The zeta variances range from .05 for interpretation to .57 for content.

The scale factors of the ordinary indicators are all greater than .59.

The scale factors for the common variables are presented in Table 32. The scale values for the lambda y's range from -.35 for interpretation to .36 for process of conversation. The scale values for lambda x are all negative and range from -.07 for closeness to -.63 for emotion.

Table 32

Scale Values for Common Variable in Model IV in TV Situation

		5
	1	-.35
	2	.16
$\Lambda_y =$	3	.18
	4	.23
	5	.36

		3
	1	-.07
$\Lambda_x =$	2	-.13
	3	-.36
	4	-.63

The residual matrix is contained in Table 33. The greatest residual is a -.081 for content and role.

Table 33

Residual Matrix for Model IV in TV Situation with Common Variable

	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4
y_1	.000								
y_2	.000	.000							
y_3	-.000	.004	-.000						
y_4	-.001	-.009	-.003	.011					
y_5	-.015	.010	.041	.007	.004				
x_1	-.002	.007	.017	-.007	.095	.000			
x_2	.006	-.035	-.066	.041	-.031	-.017	.000		
x_3	-.010	-.081	.059	.010	.209	-.022	.011	.000	
x_4	.000	.000	-.000	.001	.027	.008	-.022	.023	.000

n = 93

The χ^2 value for this model is 28.49 with 11 degrees of freedom. The ratio of chi-square to degrees of freedom is 2.59 to 1. The probability level for this model is .0027, which, while approaching .05, is still indicative of a poor fit of the model to the data.

Results for Model IV with Common Variable in the Typical Situation

The results for the typical situation are contained in Figure 12. None of the paths should be trimmed from the model in this situation using Land's criterion. However, 4 paths--content and communication, .12; emotion and interpretation and selection, .10--have absolute values between .09 and .14. The remainder of the paths are greater than .26.

The measurement error variances for communication* indicants are moderate: .42 for process of conversation and .16 for conversation options.

The zeta variance for the sole multiple indicator true variable, communication, is -.01. The other zeta variances range from .12 for interpretation to .57 for selection.

The scale factor for the sole ordinary indicator, process of conversation, is 1.25.

The scale factors for the common variable are presented in Table 34. The scale factors for the lambda y's range from .90 for interpretation to -.27 for content. The scale values for the lambda x's are .24 for emotion and .74 for relationships.

The χ^2 value for this model is 3.8798 with 1 degree of freedom. The probability level is .0489. The model

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*As in the typical model in Chapter II the relationship indicants were converted into an index.

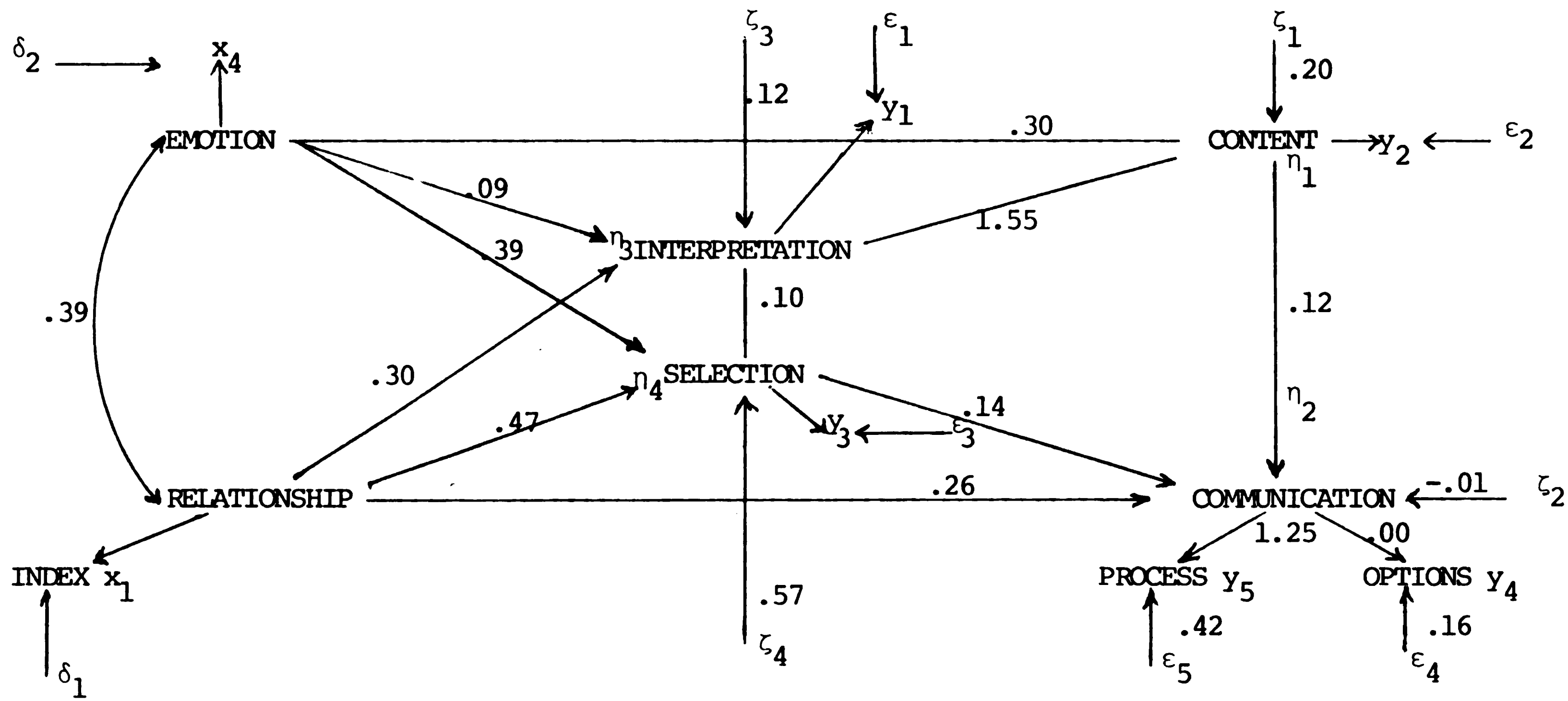

Figure 12. Results for Model IV with the Common Variable in the Typical Situation*

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* $\chi^2 = 3.8798$, df = 1, probability level = .0489
n = 79

Table 34

Scale Values for Common Variables in Model IV in Typical Situation

		5
	1	.90
	2	-.27
Λ_y =	3	.03
	4	.85
	5	.63

		3
Λ_x =	1	.74
	2	.24

approximates a good fit to the data.

No residual is greater than -.100, (see Table 35)

<u>Results of Model IV with Common Variable in Radio Situation</u>

There is a slight change in the parameters to be estimated in Model IV in the radio situation. The variances of the true exogenous variables in the phi matrix were set at a value of 1.00 instead of being estimated by the program. This was necessitated by the failure of the LISREL program to arrive at a solution for this model when these parameters were estimated.*

---

*Three different sets of start values were used to attempt a solution to this model; all of them reached an

Table 35

Residuals for Model IV with Common Variable in the Typical Situation

	y_1	y_2	y_3	y_4	y_5	x_1	x_2
y_1	.000						
y_2	-.000	-.000					
y_3	-.000	.000	.000				
y_4	-.002	-.000	.000	.000			
y_5	.007	-.000	-.000	.000	.000		
x_1	.000	.000	.000	.000	.000	.000	
x_2	.000	-.000	.000	.021	-.077	.000	.000

---

unsuccessful conclusion after all of the models had iterated for more than 600 seconds of compter time. All of these attempts, which were supplied start values from previous runs, concluded there iterations with a message that IND = 2 ¶ IND = x is used by LISREL to indicate the kind of conclusion that a run has come to. A value of zero indicates a successful conclusion. The conclusion that all other runs reported here came to. A value of 4 indicates that the model hasn't arrived at a conclusion; values from this run can be resubmitted for continued iterations that may result in a value of 0. A value of 1, 2, or 3 indicates that a "serious problem" (unspecified as to type) has been encountered and the minimization function cannot continue (Jöreskog and Van Thillo, 1972).

In addition to merely feeding in the start values from previous runs attempts were made to "guess" at start values that would produce a conclusion. All such attempts ended in failure.

Attempts were also made to estimate differing parameters among the error terms and the residuals, one of these was successful--when the whole psi matrix was estimated. However, the gain in the chi-squre value was not sufficient to overcome the loss in degrees of freedom when compared to the model presented in this section.

Table 36

Scale Values for Common Variables in Model IV in Radio Situation

		5
	1	.52
	2	-.06
Λ_y	3	-.39
	4	-.19
	5	.30
		3
	1	.12
Λ_x	2	-.20
	3	.16
	4	-.34

The results for the radio model with the common variable with the variances in the phi matrix fixed at 1.0 are presented in Figure 13. According to Land's criterion one path, that between emotion and interpretation (.04), should be trimmed from this model. Another path, that between content and communication (-.14), would appear to have only a moderate effect. The rest of the paths appear to have a substantial affect on their dependent variables.

The variances of the errors of measurement for the multiple indicators range from .32 for closeness to .55 for role.

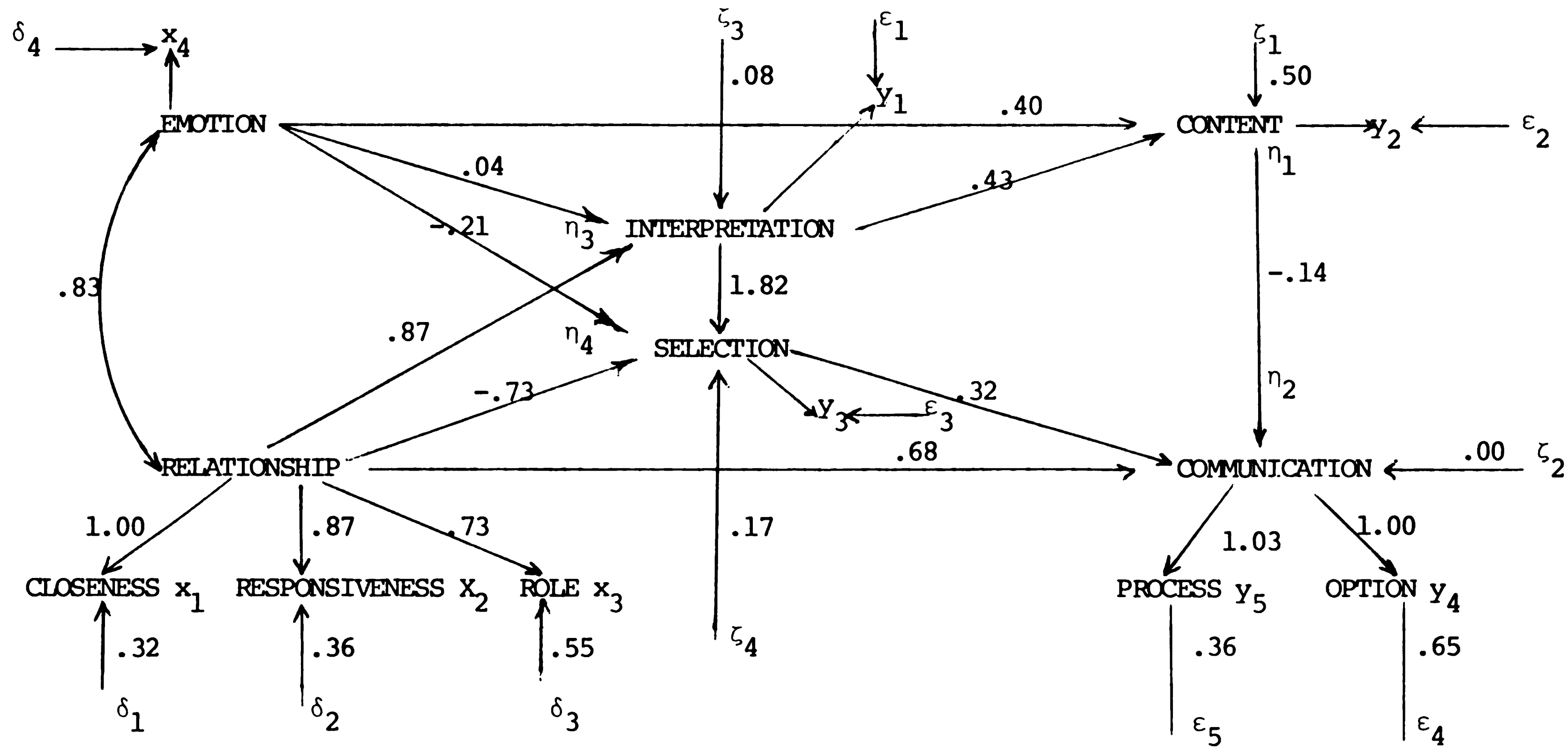

Figure 13. Results for Model IV in Radio Situation with Common Variable*

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* $\chi^2 = 40.33$, df = 13, probability level = .0001

The zeta variances for the single indicator variables are .08 for interpretation, .50 for content, and .17 for selection. For communication the zeta variance is -.06.

The scale factors for the ordinary indicators are .73 for role, .87 for responsiveness, and 1.03 for process of conversing.

The scale factors for the common variables range from -.06 for content to .52 for interpretation (absolute values) among the lambda y variables. The lambda x's range from .12 for closeness to -.34 for emotion.

The residual matrix (Table 37) contains no considerable residuals.

Table 37

Residuals for Model IV with Common Variable in Radio Situation

	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4
y_1	.157								
y_2	.122	.095							
y_3	.129	.095	.106						
y_4	.168	.258	.104	.131					
y_5	.128	-.000	.133	.136	.140				
x_1	.238	.295	.174	.193	.182	.337			
x_2	.159	.014	.170	.220	.163	.230	.146		
x_3	.116	.020	.071	.166	.094	.184	.151	.103	
x_4	.136	.104	.112	.193	.066	.259	.078	.116	.113

The χ^2 value for this model is 40.32 with 13 degrees of freedom. The ratio is 3.10 to 1. The probability level for this model is .0001, again indicating a poor fit of the model to the data.

Comparison of the Tests of Model IV

In this section the results of the three tests of Model IV will be compared. The following section will then compare this model to the results for Model IIa presented in Chapter III.

The chi-square values presented in summary form in Table 38 indicate some slight differences, largely caused by the differences in the degrees of freedom of the models, in the goodness of fit of the model to the data. The fit in the three situations, while not significant, approaches significance. In general, when Joreskog's (1974) previously mentioned caution concerning the chi-square value is taken into consideration, and the demonstrable problems with measurement error variances and multicollinearity are noted, it would appear that Model IV provides a reasonable fit to the data.

Table 38

Goodness of Fit of Model IV with the Common Variable in the Three Situations

	χ^2	Degrees of Freedom	Ratio	Probability Level
Radio	40.33	13	3.10	.0001
TV	28.49	11	2.59	.0027
Typical	3.88	1	3.88	.0489

Table 39 compares the values of the paths between the true exogenous variables and the true endogenous variables. All the values of the paths for the TV model save for γ_{11} are much higher than the paths in the other two models. The only path that appears to be somewhat stable across models is γ_{11}, the path between emotion and content, which ranges in value from .30 for the typical situation to .55 for the TV situation.

Table 39

Values of Paths Between Exogenous and Endogenous Variables for Model IV with the Common Variable in the Three Situations

	Radio	TV	Typical
γ_{31}	.04	-1.00	.09
γ_{41}	-.21	1.64	.39
γ_{32}	.87	1.88	.30
γ_{42}	-.73	-2.08	.47
γ_{11}	.40	.55	.30
γ_{22}	.68	2.79	.26

Table 40 compares the values of the paths between the true endogenous variables. Again there is little apparent stability across situations. Only the relative magnitudes of the $-\alpha_{13}$ paths for the radio and TV situation, the $-\alpha_{21}$ path for the radio and typical situation, and the $-\alpha_{43}$ path for the radio and the TV situation have any similarity.

Table 40

Values of Paths Between Endogenous Variables for Model IV with a Common Variable in the Three Situations

	Radio	TV	Typical
$-\alpha_{13}$	.43	.34	1.55
$-\alpha_{21}$	-.14	-.60	.12
$-\alpha_{24}$	.32	-1.04	.14
$-\alpha_{43}$	1.82	1.67	.10

The zeta variances are presented in Table 41. The zeta variances for interpretation are veyr similar across all of the situations. The zeta variances for content and selection in the radio and TV situations are somewhat similar.

Table 41

Zeta Variances for Model IV with the Common Variable in the Three Situations

	Radio	TV	Typical
True Endogenous Variables			
Content	.50	.57	.20
Communication	-.06	-.49	-.01
Interpretation	.08	.05	.11
Selection	.17	.19	.57

The scale factors for the ordinary indicators are contained in Table 42. The responsiveness values for the radio and TV situations, .87 and .88 respectively, are

Table 42

Scale Values of Ordinary Indicators in Model IV with a Common Variable in the Three Situations

	Radio	TV	Typical
Process of Conversing	1.03	.59	1.25
Responsiveness	.87	.88	*
Role	.73	.68	*

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*No values because index used for relationship indicators.

essentially the same. The role values for these two situations are also quite similar: .73 for radio and .68 for TV. The process of conversation values reveal no clear similarities.

Table 43 contains the scale values for the common variables. None of these scale values, although some are quite substantial, reveal a clear pattern.

Table 44 contains the measurement error variances. Except for role, which has the same value in both the radio and TV situations and process of conversation, none of these values fit a discernable pattern.

Tables 27, 33, and 35 contain the residual matrices for the radio, TV and typical situations respectively. The only noteworthy finding here is that there is no residual greater than -.100 in any of the matrices.

Table 43

Scale Values for Common Variables in the Three Situations

	Radio	TV	Typical
y_1	.52	-.35	.90
y_2	-.06	.16	-.27
y_3	-.39	.18	.03
y_4	-.19	.23	.85
y_5	.30	.36	.63
x_1	.12	-.07	.74+
x_2	-.20	-.13	*
x_3	.16	-.36	*
x_4	-.34	-.63	.24

*No values for these variables because relationship index used for these variables.

+Scale value for index.

Comparison of Model IIa and Model IV

In this section Model IIa discussed in Chapter III and Model IV presented in this chapter will be compared. First, the tests for each of the situations will be discussed, then an overall comparison of the models will be presented.

Table 44

Measurement Error Variances for the Multiple Indicators in Model IV with the Common Variables in the Three Situations

	Radio	TV	Typical
Process of Conversing	.36	.55	.42
Conversation Options	.45	.00	.16
Closeness	.32	.42	*
Responsiveness	.36	.53	*
Role	.55	.55	*

*No values because index used for these variables in typical model.

The paths between the true exogenous and the true endogenous variables are different for the two radio models; only the path γ_{11} between emotion and content is similar: .51 in Model IIa and .40 in Model IV. The $-\alpha_{13}$ path has similar values, .31 and .43 respectively.* The paths between content-communication, -.14 and -.15, and selection-communication, .15 and .32, are also quite similar. The zeta variance for content, .51 and .50; and communiction

*In this section the first reported value will be for Model IIa presented in Chapter III, the second value will be for Model IV presented in this chapter.

-.12 and -.06 and interpretation, .08 and .17, are all quite similar. The scale factors for ordinary indicators are also quite similar: 1.10 and 1.03 for process of conversing; .87 for both models for responsiveness; and .82 and .73 for the role variable. The measurement error variances are also quite similar with those for Model IVa being uniformly lower or equivalent to the values in Model IIa.

Of the paths between the true variables in the television models only $-\alpha_{13}$ has equivalent values, .33 and .34. The zeta variances aren't similar. The scale factors of the ordinary indicators are remarkably similar; process of conversation, .64 and .59; responsiveness, .87 and .88; and role, .68 in both models. The measurement error variances of the multiple indicators are similar, but they reveal no uniform pattern.

The paths between exogenous and endogenous variables in the typical model are somewhat similar with γ_{31} having values of -.09 and .09 and γ_{41}, 51 and .39. Only the $-\alpha_{21}$ path, .02 and .12, and the $-\alpha_{24}$ path, -.16 and .14, have any similarity among the true endogenous paths. The zeta variances for communication and selection reveal some similarities in the two models. The scale values of the two models are dissimilar. The measurement error variances for process of conversations, .41 and .42, and for conversation options, .14 and .16, are very similar.

Across all the models, the γ_{32} path, from relationship to interpretation and γ_{22} path between relationship and communication would appear to be particularly powerful determinants, with values never lower than .30 and .26 respectively.

The $-\alpha_{21}$ path, between content and communication appears, except in the case of Model IV in the TV situation, (-.60), to be relatively weak with values ranging from -.16 to .15.

The scale factors for responsiveness and role appear to be two of the most stable parameters across models.

The measurement error variances for the relationship variables also appear to be relatively stable across models.

These are the only apparent similarities in the values of parameters across the models.

<u>Relationships Among True Variables</u>

In this section the relationships between the true variables in the model will be discussed. The emphasis here will be on the identification of stable paths across the situations and on the strengths and weaknesses of the model originally proposed in Chapter I.

Using Land's criterion none of the paths proposed in the original model should be dropped. The results from both the LISREL runs and OLS regressions presented earlier support the addition of two paths to the model, paths between emotion-content and relationship-communication. In fact, the most stable path across all of the models is the one between emotion and content. The paths between relationships and interpretation and between relationships and communication are also stable in the sense that their values are always substantial.

The remainder of the paths between true variables in the model are unstable either switching sign or producing substantially different values across situations.

This instability points to the possible effects of third factors, such as the situation, on the relationships between variables across models. The possible sources of the differing values of the paths between the true variables will be discussed in more detail in the next chapter.

The addition of the path between the underlying and surface variables and their relative magnitude and stability call into question the assertion made in Chapter I that interpretation and selection act as mediators between the underlying and surface variables. The patterns and values of the paths across situations would suggest that this is not the case, although the model does suggest that these variables are powerfully affected by relationships and are for the most part major determinants of the surface variables. Still their effects would appear not to come from their role as mediators.

The strength of the relationships between the exogenous and endogenous variables would tend to support the argument that emotion and relationships are the key underlying factors in social interaction.

In sum, there are relatively few stable paths between the true variables indicating that there are powerful situational factors affecting these relationships. While the model results suggest that no path in the original model should be deleted, and that two should be added, it does not support the notion that the mediating variables are indeed mediators.

Effect of Introduction of Common Variable

What was the effect of the introduction of the common variable into the model of social interaction? The most noticable effect was a substantial reduction in level of χ^2 relative to the degrees of freedom (see Table 45). The introduction of the common variable didn't, however, produce common values for most of the paths between true variables. While this wasn't necessarily anticipated, it was hoped that a clarification of the measurement error variances and zeta variances would produce more stable parameters across the situations.

The effect of the common variable on the values of the zeta variances was mixed. In the radio situation there was a slight reduction in the zeta variance for content, communication, and interpretation; and a major reduction, from .51 to .17, for selection. In the TV situation there was a substantial drop in the zeta variances of selection and interpretation, but there was a substantial increase for content,

Table 45

Differences Between Model IIa and Model IVa in the Three Situations

Situation	Model IIa		Model IVa		Differences
Radio	χ^2_{20}	-	χ^2_{13}	=	χ^2_7
	79.11	-	40.33	=	38.78
TV	χ^2_{20}	-	χ^2_{11}	=	χ^2_9
	84.91	-	28.49	=	56.42
Typical	χ^2_8	-	χ^2_1	=	χ^2_7
	55.75	-	3.88	=	51.87

*χ^2 values greater than $\chi^2_7 = 24.32$ and $\chi^2_9 = 27.87$ respectively are significant at the .05 level.

and a high negative variance for communication. In the typical situation there was a reduction in the zeta variance for content, communication, selection and interpretation.

The scale factors of the ordinary indicators remained stable, indicating that the scale factors of the common indicators values were drawn from other parameters.

There was a drop in the measurement error variance associated with the multiple indicators in the radio situation. Two of the indicators in the TV situation dropped and two of them increased, while the value of one remained the same. In the typical situation the measurement error variances are essentially the same for both models.

The scale values for the common variables themselves reveal little in common, except the magnitude of the values for content are relatively low and the values for interpretation and process of conversation are relatively high across situations.

Overall a comparison of the values of the other parameters with the scale values reveals that process of conversations had a decrease in its level of measurement error variance in the radio and TV situations and the highest positive scale values in the radio and TV situations. However, no other clear, discernable relationship between the scale values and the other parameters in the model is discernable.

In sum, the introduction of the scale values reduced the level of the zeta variance; the scale values of the ordinary indicators remained the same; the value of the paths between true variables were still inconsistent across situations, and there was a slight overall drop in the level of measurement error variance.

The major contributors to the scale factors for the common variable, however, appears to be the residuals in the correlation matrix that weren't accounted for in the parameters of Model IIa. While the common variable pooled some of the measurement error variance and zeta variance, the improvement in the χ^2 value of Model IV appears to result from the reduction of the residuals in the correlation matrix. Therefore, the major source of improvement in Model IV is probably a result of the fact that the model is now accounting for the variance of a factor (or factors) that is determining to some extent all of the variables, but which wasn't included in the model.

Methodological Explanations of the Results

The problem of high measurement errors variances, high zeta variances and multicollinearity have all been discussed in some detail in this chapter. To a certain extent the model with the common variable ameliorated these problems. However, they are still present, although to a lesser extent, in this model. It still must be noted that these flaws in the model have substantially contributed to the difficulty in finding stable parameters across situations and to the failure of the model to provide a good fit to the data.

There is also a possibility that rather minor violations of the assumptions of linearity, additivity, etc. account for the rather small difference between the level of probability of the tests of the common variable model and the level of probability needed for a model that would provide a good fit to the data.

To some extent the differences in parameters across models can be attributed to the changes in some of the models made necessary by technical problems in the LISREL program.

The conversion of the relationship indicants into an index in the typical situation is likely to have contributed to the differences in the parameters in this situation compared to other situations. The problems with the estimation of the variances of the exogenous variables in Model IV in the radio situation also probably contributed to the instability in the parameter estimates across situations. It has been the author's experience (and to some extent this is born out by the results contained in Appendix F and in the various tests of the models in the radio situation) that even minor differences in the parameters estimated in a model can result in substantial differences in the values of the parameters within even the same situation. Regrettably for Model IV the tests in each one of the situations was slightly different.

Other technical problems exist with the measuring instrument itself. The same respondent answering contiguous questions probably contributes substantially to the level of multicollinearity in the data (Shoenberg, 1972). The wording of the questions probably also made the measurement of the variables more sensitive to situational effects than they otherwise might have been. The lack of multiple indicators for some of the variables probably contributed to their high zeta variances, and may have distorted the nature of the relationships among the true variables, because the indicators failed to cover the entire range of the true variable. On the positive side most of the variation in the indicants, as reflected by the scale factors, appears to be attributable to their true variables. Finally, the scaling procedure probably contributed to the substantially high variances around most of the means.

In sum, these various technical flaws by themselves may account for the slight difference between the manifested probability levels associated with Model IV and the level necessary for a good fit of the model to the data. In addition they probably contributed substantially to the instability in many parameters across situations.

The Role of Unspecified Factors in the Results

The high zeta variances and the behavior of the common variables point to the existence of factors that weren't specifically included in the model that may have affected the results. In this section the effects of these unspecified factors will be examined. In Chapter V the possible nature of the factors that produce these effects, and the possible role of these factors in an enlarged model of social interaction, will be discussed. This section is primarily concerned with two questions. What is the nature of the effects of these factors? Are the effects uniform across variables and relationships, and how do they act on the model as a whole?

The descriptive statistics reveal substantial differences in the variables across situations. The simple correlations between the variables were extremely high in the typical situation, somewhat lower in the radio situation and much lower in the television situation. This indicates that the relationships among the variables in the model of social interaction are substantially affected by situational factors that act to weaken the relationships in situations where media is present, Apparently the more intrusive the media, the more pronounced the effects.

There are substantial differences in the levels of the zeta variances across situations.* The zeta variances for communication have the lowest values across situations, in most instances being zero or near zero in value, indicating that communication is primarily determined by its associated parameters in the model. Interpretation also has a low zeta value, again indicating that its primary determinants are specified in the model. On the other hand selection appears to be moderately determined and content appears to be substantially determined by unspecified variables not included in the model. This pattern suggests that the elements of social interaction are differentially affected by unspecified factors.

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*Only two of the true variables, communication and relationships, have multiple indicators. The variance of their errors of measurement are incorporated in the variances of their zetas. This should act to increase the level of the zeta variance for those variables with only one indicator.

The results for the common factor indicate that although the direction of the relationships is uncertain, interpretation and process of conversing are substantially affected by it,* and that, save for conversation options in the typical situation, the other indicants of the true endogenous variables are relatively unaffected. There is no clear relationship between the exogenous true variables and the common factors across situations, and it would appear that although the relationship and emotion indicants are somewhat affected by common factors, they are also affected by other unspecified factors separately.

In sum, the common factor doesn't appear to account for all of the undetermined variation in the true variables and it would appear that some of the variables are determined by unique causes.** Further, the effects are not uniform across situations.

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*Remember that the common factor should include those factors, or that factor, which all of the endogenous indicants have in common.

**The possibility remains that two of the endogenous variables may share a common cause. The only evidence that speaks of this, since the covariance of endogenous variables was not estimated in Model IV, is the covariance in Models IIb and IIIb in the radio situation. None of these covariations were substantial, with only the covariation between content and communication (.21) in Model IIb and between selection and content (-.21) in Model IIIb being even moderately high.

The failure to specify these factors in the model accounts in some measure for the failure of the model to provide a good fit to the data and for the instability of parameters across situations. These results don't support the assertion made in Chapter I that situational differences might cause some slight differences in the values of parameters, but that they wouldn't contribute to major differences in the values of parameters or to differences in the direction of relationships across situations.

Conclusion

Model IIa tested in Chapter III suffered from serious problems with multicollinearity exacerbated by high measurement error variances and the high zeta variances. A modified LISREL model was proposed to ameliorate these problems. Although this modified LISREL model was somewhat successful in this regard most of the substantial improvement in the fit of the model to the data appears to come from the reduction of the residuals in the correlation matrices. The pattern of the results indicated that there are factors not included in the original model that impinge substantially on the variables and the relationships in the process of social interaction. Given this, and the various technical problems associated with the tests and with the data, there would appear to be reason to be optimistic that, with certain modifications in data collection procedures and with the model itself, the current framework can eventually provide the basis for an accurate model of the process of social interation.

CHAPTER V

IMPLICATIONS OF THE RESULTS FOR FUTURE RESEARCH

In this concluding chapter the implications of the tests of the model will be discussed. First the general methodological implications will be discussed, then suggestions will be offered on how the methodological problems found here may be rectified in future research. Next the substantive implications of the results will be detailed. This chapter will conclude with preliminary suggestions on the form of future models of social interaction.

Methodological Implications

It would appear that a substantial part of the results are attributable to methodological problems; e.g. multicollinearity, slight differences in the models tested in varying situations, measurement error, etc. These results have some larger implications for the use of OLS multiple regression and LISREL in other settings.

First, if only OLS multiple regression had been used the model would have been substantially supported, and the problems with measurement error and multicollinearity may have gone unnoticed. LISREL provided a means of detecting and then of analyzing these problems so that new directions for future research could be identified.

Second, there is a paradox in the use of LISREL with multiple indicators, the purpose for which LISREL was designed. Multiple indicators of the same process are going to be correlated, and hopefully highly correlated, but if they are correlated, then the determinant of the correlation matrix is going to be low. If the determinant is sufficiently low, and, if the model is correct, then the program won't function; if the determinant is slightly higher, then it will work but the estimates of parameters will be doubtful. The more successful you are in getting powerful, highly correlated indicators, the more likely it will be that the results of the program will be of little use in estimating particular parameters.*

This paradox leads to the conclusion that LISREL may not be well suited for models of this type, where all of the variables are elements of the same process and where there is a high degree of correlation between indicators of these variables. LISREL is probably most successfully used when there is a low degree of correlation between the causes of a variable, and between indicators of a single true

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*In a curious way the low determinants of the correlation matrices, which have created so many problems in testing the model are actually very supportive of it. The determinants indicate, in essence, that there is an almost perfect linear dependence among some subset of the variables. Thus, the determinants indicate that these variables are closely bound together, exactly what would be expected for the elements of the same process.

variable. These conditions, however, would seem to be met in only a limited range of social phenomena.

The results suggest several ways that future research could be used to clarify the issues discussed here. Perhaps the most important initially is to overcome methodological/technical problems so that the substantive paths in the model can be clearly tested.*

The first thing that could be done to provide a clear test of the model, is to attempt to create indicators that are as orthogonal as possible. This is a very difficult task when you are dealing with a model that seeks to explore the relationships between elements of the same process. But, to the extent possible, work should be done on developing indicators for the different true variables that are as distinct as possible and that don't have correlated errors built in by the method of data collection.

One of the ways to reduce multicollinearity is to insure that different methods are used to measure the variables. One solution to this problem is to test the model in a situation that allows for the systematic observation of the process of social interaction by differing coders.

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*The ultimate irony in the results is that the estimates of the error terms, zeta variances, and scale values reveal more stability and invariance across situations than the more substantively interesting values of the paths between true variables.

Observation of interactants could also serve to control for some of the extraneous sources of variation in social interaction present in the data used here. That is the people that answered questionnaires engaged in interaction with members of differing sexes, with differing numbers of people, in different physical surroundings, with differing preceding events, and watched or listened to different media presentations. All of these factors serve to increase the random error present in the measurement of these variables.

The model should also be tested in a situation that allows for the observation of social interaction over time. The model tested here was static since it was felt that it would be inappropriate to test a dynamic model of social interaction with cross sectional data. Further it is unlikely that any variable, at the same point in time, in this model feeds back on a variable that causes it. It is more likely that one variable causes another at time 1, say emotion causing interpretation, and interpretation at time 2 causes a certain emotional level at time 3. Development of a truly dynamic model and the test of the model over time, not with cross-sectional data, is needed. In many ways it is surprising that the model provided as good a fit as it did, since it wasn't dynamic.*

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*A test of the model over time would probably also be more sensitive to the effects of the situation, since studies

Substantive Implications

In this section the general substantive significance of the paths between true variables in the model will be explored. The reader is cautioned that the results of the tests of the model will be treated here as if they weren't subject to the methodological problems that probably contributed strongly to to the instability of the various paths across models.

The covariance between emotion and relationships is strongest in the radio situation, somewhat weaker in the TV situation, and weakest in typical situation. Research (Johnson, 1976) has indicated that radio often acts to set a mood between interactants. As a result it might be expected that radio could result in a greater consonance between emotion and relationships. On the other hand the weaker relationship between these two variables in the typical situation suggests that in the absence of competing or mood enhancing stimuli emotions and relationships are less related to each other.

The results suggest that emotion is a substantial direct cause of content in all situations. This suggests, given the manner in which these variables were operationalized, that the higher a person's level of emotional arousal the more the content of their interaction changes.

(Johnson, 1976) have indicated that a television situation has a dramatic impact on the continuity of social interaction.

In the television situation there is a strong negative causal influence from emotion to interpretation, while in the typical situation there is a minimal positive influence, and in the radio situation there is essentially no causal influence. This suggests that a person's level of emotional arousal has little bearing on his interpretation of the interaction when there is no strong competing stimulus in the environment. However, in the presence of a strong competing stimulus, TV for instance, the more emotional someone becomes the lower is his interpretation. Thus the more emotional a person is the less likely he is to possess the capacity to sort out all of the conflicting stimuli in a complex situation.

In each of the situations there is at least a moderately strong positive causal relationship between relationships and interpretation. This suggests that the closer to others, the more responsive to others, the greater the individual's interactants are knowledgeable of whom they are, the more able they are to interpret the interaction. This causal path is stronger in the presence of competing stimuli in the environment suggesting that they act to narrow the number of factors an individual depends upon for his interpretations. As this happens relationships apparently become more important in an individual's interpretations.

The path between relationships and communication is strongest in the TV situation and weakest in the typical situation. This indicates that the more involving the situation, the greater is the influence of relationships on communication patterns.

The relationships of the exogenous variables to selection are interesting. The patterns suggest that relationships are strongly negatively associated with selection in the media situations and moderately positively related in the typical situation, while emotion is increasingly positively related to selection from the typical to the media situations. Emotions apparently act, expecially in the presence of involving stimuli, to increase the level of an individual's concentration. Relationships on the other hand, in the presence of strong stimuli, act to decrease the level of attention individuals pay to any one thing. Thus a high level of relationships compels individuals to split attention between other interactants and the media. On the other hand a high level of emotion appears to cause an individual to focus his attention on one element of the environment.

Contrary to expectations relationships are a very powerful predictor of other variables in these situations. Thus either they are more clear cut in media situations than originally anticipated or relationships are even a more powerful predictor than first assumed.

Suggested Model for the Process of Social Interaction

The results reported here suggest several changes in the model originally proposed in Chapter I. Naturally the suggestions made here are tentative, and are at times based on fragmentary evidence in the tests of the models of social interaction presented in Chapters III and IV.

It appears that the current categories of social interaction should be reduced. Emotion and relationship* should be retained in any model of social interaction that is developed, since both of these variables appear to be the primary determinants of the other categories of social interaction.

The reduction of the number of true variables that lies within the process of social interaction will come at the mediating and surface levels. The results clearly call into question the suggested mediating role of the interpretation and selection variables. It would appear that the underlying variables act directly on the surface variables.

If these variables aren't mediating variables, then what are they? An argument could be made that the

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*The incorporation of other "true" exogenous variables should also reduce some of the technical problems caused by these variables now. While in the current model these variables are exogenous in the sense they are not caused by other variables in the system, they are not exogenous in the sense of lying outside the system described in the model--rather they are intimately associated with other elements of the process. In fact this intimate association, as a result of the high degree of covariation between emotion and relationship, contributed substantially to the problems of multicollinearity present in the tests of the model. The addition of other true exogenous variables to the model should remove the major flaw in these two variables.

distinction between the surface and the mediating variables is really artificial, that these two classes of variables are really manifestations of the same underlying process. This is especially true for interpretation and content, which are intimately associated with each other. Conceptually in fact it could be suggested that content is the observable manifestation of the underlying true variable of interpretation. Thus, these two variables should be reduced into one true variable called interpretation.

Similar reasoning holds for communication and selection. Selection could be viewed as just another manifestation of the processes by which substance is transferred from one interactant to another. That is who an interactant selects to talk to and how much attention he/she pays are really just another observable manifestation of communication processes. Thus these two variables should be merged into a new variable labeled communication.

The reconstituted model of social interaction is presented in Figure 14. The relationships between variables in this model are essentially the same as before. In the next section this model will be expanded to include other true exogenous variables that represent the effects of situational factors on the model.

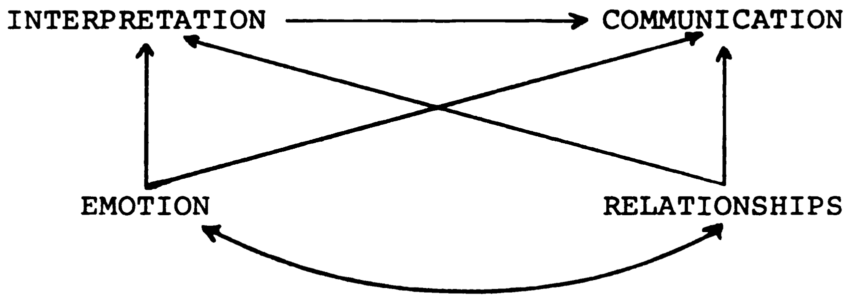

Figure 14. Suggested Modifications in Model of the Process of Social Interaction.

Outside Factors in New Model

The results point to the existence of outside factors that affect the variables in the model. The failure to specify these outside factors in the original model probably contributed to the poor overall fit of the model to the data and the instability of parameters across models, for as Watzlawick, et al. (1967, p. 20) point out, "a phenomenon remains unexplainable as long as the range of observation is not wide enough to include the context in which the phenomenon occurs." The results also suggest that the effects of outside influences are not uniform across variables and in fact some isolated factors may be major determinants of single variables within the model. "It is obvious, however, that the environment is not an undifferentiated medium in which people are immersed; it clearly involves a variety of active processes which selectively spur, guide and restrain behavior" (Barker, 1963, p. 42).

In this section a new model will be proposed that contains some preliminary thoughts on the nature of environmental influences identified in Chapter I: individual characteristics, rules, context, and situational factors.

One element of rules that apparently impinges upon interaction in these situations is the topics that can be discussed. These rules govern the kinds of substance that can be made manifest in an interaction. The literature described in Chapter I suggests that in television situations in particular there are rules that set the agenda of topics that can be discussed.* These rules related to agenda setting probably account for the substantial variances of the residuals for content that weren't related to the common factors or to the covariance of content with other variables, especially in the radio and TV situations.

For the moment there are two element of context that would appear to impinge upon the variables within the model of social interaction. The first of these is the purpose for which interactants come to an interaction. It was noted earlier that one of the primary purposes interactants come to the television situation for is sociability. This factor

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*Agenda setting and some of the other concepts discussed in this section are not traditionally considered to be variables, but they can be operationalized in variable terms. For example, the range or number of topics discussed are two ways of quantifying agenda setting.

could be seen as primarily affecting the emotion and relationship variables within the interaction, and it might account for some of the manifested covariation between these two variables, especially in relation to the responsiveness and closeness indicants of relationships.

The second contextual element that could be seen to have an effect on the variables within the model is the short term historical pattern of the interaction. The historical pattern of the interaction should primarily affect he interpretation variable, and to a lesser extent affect emotions and relationships.

Individual characteristics can also be seen as affecting the variables in each of these models. However, the nature of these characteristics and their relationship to variables in the model is too complex an issue to deal with at this preliminary stage of modeling. Hopefully the effects of these factors can be treated as random error that cancels out over a large n.

Two situational factors are probably important for the process of social interaction. One is the extent to which there are compelling outside stimuli present. If anything represents the common factor in the models of social interaction tested in Chapter IV it is probably the extent of sensory involvement of the interactants with stimuli other than the other interactants. This variable can be viewed as having a determinant effect on the reconstituted variable of communication which includes selection, and somewhat less of an effect on all of the other elements of the model.

The setting in which the interaction occurs, that is the physical nature of the surroundings, probably also has an effect on the relationships between variables in any one interaction situation, especially upon emotions.

The reconstituted model of social interaction is contained in Figure 15. This model is suggested by the results and it represents the preliminary thinking on what a modified model, based on the current evidence, would look like.

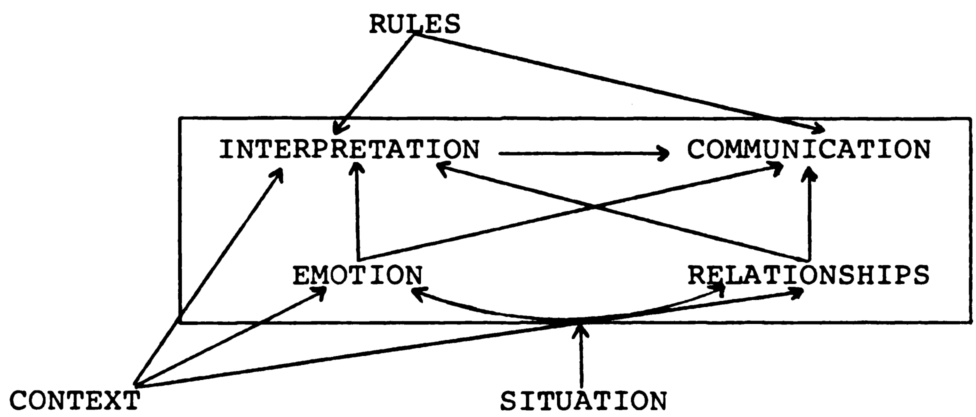

Figure 15. A Suggested Expanded Model of the Process of Social Interaction.*

*The variables within the box are the categories of the process of social interaction. The variables outside the box represent exogenous variables that effect the process of social interaction. Arrows pointing to the box, instead of to one of the variables, are meant to indicate that an exogenous variable effects all of the elements of the process social interaction.

Conclusion

In this dissertation several categories of the process of social interaction were isolated; these categories were then used to construct a model of the process of social interaction. A means of testing the model was described in Chapter II. The model was tested in Chapter III. OLS multiple regressions of the individual dependent variables in the model revealed that their respective independent variables accounted for quite substantial proportions of their variation. However, the overall tests of the model by means of LISREL revealed that the overall model provided a disappointing fit to the data. A revised model designed to correct some of the methodological flaws in the original model and to account for common sources of variation in the true variables was proposed and tested in Chapter IV. This model produced a substantially better fit, although still not a good fit, to the data. Given the low ratio of degrees of freedom to chi-square exhibited by this model there is every reason to believe that a test of the reconstituted model proposed in this chapter will produce a successful fit of the model to new data.

APPENDIX A

Category Schemes for Social Interaction

APPENDIX A

CATEGORY SCHEMES FOR SOCIAL INTERACTION

This appendix reviews thirty category schemes for social interaction. It is organized by the categories of social interaction used here. The categories are identified along with their authors and the purpose that the scheme was designed to serve. Regrettably none of the category schemes reviewed here have been used to construct or to test a model of social interaction.

INTERPRETATION

Author/Scheme/Purpose	Categories
Amidon and Hunter (1966) The Verbal Interaction Category System (VICS) System For Analyzing Interaction In Classroom Settings	1. Gives Information Or Opinion 2. Gives Direction 3. Asks Narrow Question 4. Asks Broad Question 5. Accepts 6. Rejects 7. Responds To Teacher 8. Responds To Another Pupil 9. Confusion
Auld and White (1959) Analysis Of Psychotherapy	Patient's Sentences Anxiety Dependence Hostility Love Mild Agreement Resistance Sex Social Mobility Therapist's Utterances Demand Interpretation Reward

Author/Scheme/Purpose	Categories
Bales (1950) Interaction Process Analysis Description Of Interaction In Groups	1. Shows Solidarity 2. Shows Tension Release 3. Agrees 4. Gives Suggestion 5. Gives Opinion 6. Gives Orientation 7. Asks For Orientation 8. Asks For Opinion 9. Asks For Suggestion 10. Disagrees 11. Shows Tension 12. Shows Antagonism
Borgatta, E. F. (1965) Analysis of Patterns Of Social Interaction (Especially In Groups)	1. Common Social Acknowledgment 2. Shows Solidarity Through Raising The Status Of Others 3. Shows Tension Release, Laughs 4. Acknowledges, Understands, Recognizes 5. Shows Agreement, Concurrence, Compliance 6. Gives A Procedural Suggestion 7. Suggest Solution 8. Gives Opinion, Evaluation, Analysis, Expresses Feeling Or Wish 9. Self-Analysis And Self-Questioning Behavior

Author/Scheme/Purpose	Categories
	10. Reference To The External Questioning Behavior 11. Gives Orientation, Information, Passes Communication 12. Draws Attention, Repeats, Clarifies 13. Asks For Opinion, Evaluation, Analysis, Expression Of Feeling 14. Disagrees, Maintains A Contrary Position 15. Shows Tension, Asks For Help By Virtue Of Personal Inadequacy 16. Shows Tension Increase 17. Shows Antagonism, Hostility, Is Demanding 18. Ego Defensiveness
Carter *et al.*, (1951) Analysis Of Group Interaction Particularly As It Pertains To Leadership	1. Proposes And Initiates Action 2. Disagrees And Argues With A Somewhat Negative Connotation 3. Leader Roles In Carrying Out Action 4. Follower And 'Worker' Roles In Carrying Out Action 5. Abortive Or Non productive Behavior Or Problem 6. Miscellaneous

Author/Scheme/Purpose	Categories
Crowell and Schiedell (1961)	Assertion
Development Of Ideas In Discussion Group	Information
	Inference
	Substantive
	Procedural
	Volunteered
	Requested
	Initiation
	Restatement
	Clarification
	Substantiation
	Extension
	Simple Response To Request
	Pro Modification (Revision Of Prior Idea)
	Con Modification (Revision Of Prior Idea)
	Stated Acceptance
	Summary
	Imperative
	Question
	Judgment
	Synthesis
	Delayed Relationship (To Idea)
	Delayed Self Relationship (To Speaker's Idea)
Flanders (1967)	1. Accepts Feeling
System For Analyzing Interaction In Classroom Setting	2. Praises Or Encourages
	3. Accepts Or Uses Ideas Of Students
	4. Asks Questions
	5. Lecturing

Author/Scheme/Purpose	Categories
	6. Giving Directions 7. Criticizing Or Justifying Authority 8. Student Talk-Response 9. Student Talk-Initiation 10. Silence Or Confusion
Gouran and Baird (1972) Comparison Of Problem Solving And Informal Group Discussions	1. Initiates And Develops Theme 2. Agrees With Expressed Position 3. Disagrees With Expressed Position 4. Gives Information 5. Asks For Information
Lewis *et al.*, (1961) Analysis Of Student-Teacher Pupil Interaction	1. Asks For Information 2. Seeks Or Accepts Direction 3. Asks For Opinion Or Analysis 4. Gives Information 5. Gives Suggestion 6. Gives Direction 7. Gives Opinion 8. Gives Analysis 9. Shows Positive Feeling 10. Shows Negative Feeling 11. Perfunctory Agreement Or Disagreement

Author/Scheme/Purpose	Categories
Longabaugh (1966) Uncovering Structure Underlying Interpersonal Behavior (Particularly Observation Of Children's Behavior)	1. Gives Help 2. Suggests Responsibility 3. Reprimands 4. Attempts To Dominate 5. Acts Sociable 6. Calls Attention To One's Self 7. Gives Support 8. Physically Contacts 9. Is Succorant 10. Assaults Sociably 11. Assaults 12. Symbolic Aggression
McGuire and Lorch (1968) Rules Governing Natural Language Conversational Modes	Associational Orientation (Casual Conversation) Problem Solving (Conveyance Of Factual Knowledge) Interrogation Clarification Of Misunderstanding
Schiedell and Crowell (1966) Group Discussion Behavior	Substantive Themes Procedural Themes Irrelevant Themes
Snyder (1945) Description Of Non-directive Psychotherapy	<u>Therapist's Responses</u> Restating Content Clarifying Feeling

Author/Scheme/Purpose	Categories
	Interpreting
	Structuring
	Leading
	Suggesting
	Questioning
	Persuading
	Accepting
	Reassuring
	Approving
	Disapproving
	<u>Client's Responses</u>
	Problems
	Simple Responses
	Insight Planning
Steinzor (1949)	Activate And Originate
	Structure And Delimit
	Diagnose By Labeling
	Evaluate
	Analyze And Explore
	Express And Give Information
	Seek Information To Learn
	Defend
	Offer Solution
	Conciliate
	Understand And Reflect
	Give Support
	Oppose And Attack
	Show Deference
	Seek Support

Author/Scheme/Purpose	Categories
	Conform Entertain Miscellaneous Clarify Confusion
Strupp (1960) Analysis Of Psychotherapy	1. Facilitating Communication 2. Exploratory Operations 3. Clarification 4. Interpretive Operations 5. Structuring 6. Direct Guidance 7. Activity Not Clearly Relevant To The Task Of Therapy 8. Unclassifiable
Weintraub and Aronson (1962) Verbal Analysis Of Defense Mechanisms	1. Direct References (Setting Of Experiment) 2. Evaluators 3. Non-personal References 4. Shift To Past Tense 5. Negators 6. Qualifiers 7. Retractors (Detracts From Previous Statement)

Author/Scheme/Purpose	Categories
Watzlawick *et al*., (1967) Examination Interactional Patterns	Content

CONTENT

Author/Scheme/Purpose	Categories
Argyle (1969) Description Of The Ways Coordination Is Important In Social Interaction	Content
Bjerg (1968) Interplay Analysis	Topic Agons (What Is Said Or Done)
Hare (1958) Paradigm For The Analysis Of Interaction	Content
Hawes (1973) Elements Of A Model For Communication Processes	Content
Watson (1958) Description Of Formal Characteristics Of Interaction In Three Situations	Conversational Resources (Topics Of Conversation)

Author/Scheme/Purpose	Categories
Hare (1958) A Paradigm For The Analysis Of Interaction	Social Emotional Behavior A. Control B. Affection
Longabaugh (1966) Structure Underlying Interpersonal Behavior	Socioemotional Dimension
Reusch and Prestwood (1949) Structural Components Of Interaction	Emotional Reactions (internal facet)
Taylor (1954) Emotional Dimensionality Of Groups	1) Public Dimension 2) Dyadic Dimension 3) Autistic Dimension
Weintraub and Aronson (1962) Verbal Analysis Of Defense Mechanisms	Expression Of Feeling

EMOTION

Author/Scheme/Purpose	Categories
Argyle (1969) Description Of The Ways In Which Coordination Is Necessary For Social Interaction	Emotional Tone
Bjerg (1968) Interplay Analysis	Instinctual Agons (Love, esteem, etc.) Sessional Agons (i.e., damage, agon, agon of pleasing, etc.)
Carter *et al.*, (1951) Analysis Of Group Interaction, Particularly As It Pertains To Leadership	Shows A Personal Feeling

COMMUNICATION

Author/Scheme/Purpose	Categories
Amidon and Hunter (1966) The Verbal Interaction Category System (VICS) Analyzing Teacher-Student Interaction	Initiates Talk To Teacher Initiates Talk To Another Pupil Silence
Argyle (1969) Some Of The Ways Coordination Appears To Be Necessary For Interaction	Timing Of Speech
Bjerg (1968) Interplay Analysis	Conversational Agons
Bostrom (1970) Analysis Of Patterns Of Communicative Interaction In Small Groups	1 to 1 Sends Centrality 1 to Group Sends 1 to 1 Receives Receive Sent Ratio

Author/Scheme/Purpose	Categories
Hare (1958) A Paradigm For The Analysis Of Interaction	Communication Network Interaction Rate
Jaffe and Feldstein (1970) Rhythms Of Dialogue	Vocalization Pause Switching Pause Speaker Switch Simultaneous Speech
Lewis et al. (1961) Analysis Of Student-Teacher Interaction	Inhibits Communication No Communication
McGinnies and Altman (1958) Group Discussion Behavior (Attitude Change)	Verbal Output Participation Rate Of Response Recruitment (time entered discussion) Spontaneity
Pope and Siegman (1972) Description Of Psychoanalytic Interview	Informational Exchange 1) Hesitation 2) Fluency 3) Verbalization

Author/Scheme/Purpose	Categories
Watson (1958) Description Of Formal Characteristics Of Interaction In Three Situations	Conversational Style
Weintraub and Aronson (1962) Verbal Analysis Of Defense Mechanisms	Quantity Of Speech Long Pauses Rate Of Speech

SELECTION

Author/Scheme/Purpose	Categories
Argyle (1969) Important Elements Of Interaction Where Coordination Is Necessary	Nonverbal Responsiveness (Signals From One Interactant To Another Of Attentiveness)
Bostrom (1970) Analysis Of Group Discussion Statements	Selectivity (Relative Concentration)
Goffman (1957) Description Of Forms Of Alienation From Interaction	External Preoccupation Self-Consciousness Interaction-Consciousness Other Consciousness
Lewis _et al._ (1961) Analysis Of Student-Teacher-Pupil Interaction	Listens

RELATIONSHIPS

Author/Scheme/Purpose	Categories
Argyle (1969) Important Elements Of Interaction Where Coordination Is Necessary	Dimensions Of Relationships I. Role Relations II. Intimacy III. Dominance
Bjerg (1968) Interplay Analysis	Implicational Agons (Why Things Said Or Done) 1) Instinctional Agons (Power) 2) Sessional Agons (Superiority)
Hare (1958) A Paradigm For The Analysis Of Interaction	Socioemotional Behavior A. Control
Hawes (1973) Elements Of A Model For Communication Processes	Relationships

Author/Scheme/Purpose	Categories
Pope and Siegman (1972) Description Of Psycho-analytic Interview	Attraction To Interviewer Interviewer Warmth Interviewer Status
Spier (1973) Invariant Features Of Interactions	Membership Category Devices
Watzlawick *et al*. (1967) Examination of Interactional Patterns	Relationship

EXOGENOUS VARIABLES

Author/Scheme/Purpose	Categories
Bjerg (1968) Interplay Analysis	Problem Agons (Salient Problem) Service Agons (Exchange Of Services) Agons Of Material Goods (Exchange Of Material Goods)
Hare (1958 Paradigm For The Analysis Of Interactions	Task Behavior
Longabaugh (1966) Uncovering Structure Underlying Interpersonal Behavior	Task Dimension Social Activity
Spier (1973) Invariant Features Of Interactional Elements	Main Activities Local Setting Temporal Orientations Spatial Orientations

SEQUENCING, RULES

Author/Scheme/Purpose	Categories
Argyle (1969) Important Elements Of Interaction Where Coordination Is Necessary	Sequences of Behavior
Bjerg (1968) Interplay Analysis	Meta Agons (Bargaining About Which Agons To Be Activated)

APPENDIX B

Inclusion of Elements of Social Interaction in Previous Category Schemes

APPENDIX B

Inclusion of Elements of Social Interaction in Previous Category Schemes*

CATEGORY SCHEME	CONTENT	INTERPRETATION	EMOTION	COMMUNICATION	SELECTION	RELATIONSHIPS
Argyle (1969)	X		X	X	X	X
Amidon and Hunter (1966)		X		X		
Auld and White (1959)		X				
Bales (1950)		X				
Bjerg (1968)	X		X	X		X
Borgatta (1965)		X				
Bostrom (1970)				X	X	
Carter *et al*. (1951)		X	X			
Crowell and Schiedell (1961)		X				
Flanders (1967)		X				
Goffman (1957)					X	
Gouran and Baird (1962)		X				
Hare (1958)	X		X	X		X

*Category Scheme is used loosely here to refer to previous researchers' descriptions of components of social interaction.

CATEGORY SCHEME	CONTENT	INTERPRETATION	EMOTION	COMMUNICATION	SELECTION	RELATIONSHIPS
Hawes (1973)	X					X
Jaffe and Feldstein (1970)				X		
Lewis *et al.* (1961)		X		X	X	
Longabaugh (1961)		X	X			
McGinnies and Altman (1959)				X		
McGuire and Lorch (1968)		X				
Pope and Siegman (1972)				X		X
Reusch and Prestwood (1949)			X			
Schiedell and Crowell (1966)		X				
Snyder (1945)		X				
Spier (1973)				X		X
Steinzor (1949)		X				
Strupp (1960)		X				
Taylor (1954)			X			
Watson (1958)	X			X		
Watzlawick *et al.* (1967)	X					X
Weintraub and Aronson (1962)		X	X	X		

APPENDIX C

Instructions Given Telephone Solicitors

APPENDIX C

Instructions Given Telephone Solicitors

TELEPHONE APPEAL

Hello, is this (Respondent's Name). I'm (Your Name) from the Department of Communication at Michigan State University. We are looking into the ways in which TV and radio affect how people communicate with each other. This research is supported by the National Association of Broadcasters, whose professional code is subscribed to by CBS, NBC and ABC and most of the television and radio stations across the country. We need your cooperation and the cooperation of others like you in our efforts. Your participation may lead to valuable information on the effects of television and radio on American life. We would like your permission to mail you a questionnaire concerning this topic that you can complete at your leisure in your own home. Would you be willing to answer the questions and help us out? ......

IF YES, THEN: Thank you very much. We appreciate your cooperation. You can expect to receive a copy of the questions in a couple of days. Its been very nice talking to you (Respondent's Name). Good bye.

IF NO, THEN: Is there someone else in your household who might be interested in answering the questions? (IF YES, THEN ask if they are home and if they can come to the phone, then repeat the above appeal to them. If the other person is not at home, then mail out questionnaire addressed to the person that the respondent says will be willing to fill out the questionnaire, and tell subject to tell other person to expect a letter in a couple of days.)

IF STILL NO THEN: Thank you for your time.

STEPS TO FOLLOW WHEN MAKING PHONE CALLS.

1. Get card. (See attached sheet for information on how to read the card.)
2. To dial phone number first dial 174, listen for dial tone, then dial phone number that is on the card.
3. Read the telephone appeal to respondent.
4. Follow the following procedures depending upon their response.
    A. IF RESPONDENT DOESN'T AGREE TO ACCEPT THE QUESTIONNAIRE, THEN write refused, time, date, and initials below the address on the front of the card.
    B. IF THERE IS NO ANSWER, THEN write no answer, time, date, and your initial below the address on the front of the card.
    C. IF THE NUMBER IS OUT OF SERVICE, THEN write out of service, time, date, and your initials below the address on the front of the card.
    D. IF THE RESPONDENT AGREES TO RECEIVE THE QUESTIONNAIRE, THEN FOLLOW THESE STEPS:
        1. Write their subject number in the space on page 8 - the back of the questionnaire - that says questionnaire number.
        2. Write the respondent's name after Dear on the front page of the questionnaire.
        3. Address the envelope to the respondent.
        4. Fold up the return envelope and place it in the envelope.
        5. Fold up the questionnaire and put it in the envelope.
        6. Write down mailed questionnaire, date, and your initials below the address on the front of the card.
5. Go to next card.

HOW TO READ THE CARD

NAME - Found on the left hand corner.
PHONE NUMBER - Found on right hand corner.
ADDRESS - Second line, middle. If just a street address mail to Grand Rapids. If another city is named after the street address, then address the envelope to that city.
SUBJECT NUMBER - Right hand lower corner in red.

HELPFUL HINTS

Remember be polite, be considerate, be helpful, but also be firm in getting a commitment from the respondent to receive and fill out the questionnaire.

Sell them on the idea of receiving and filling out the questionnaire.

If the respondent is in a hurry make an appointment to call back at a more convenient time.

ANSWERS TO SOME QUESTIONS ABOUT STUDY

TIME - It takes about 30 - 40 minutes for most people to fill out the questionnaire.
WHY SHOULD I DO THIS?
Repeat appeals in the letter.
Say that I need this for my dissertation. For school.

TELEPHONE CALLBACKS

Hello, is this __(Respondent's Name)_. I'm __(Your Name)__ from the Department of Communication at Michigan State University. Remember we called you a couple of weeks ago and asked your permission to send some questions to you about how television effects how you talk to other people. We haven't received this questionnaire from you yet and we were wondering if you had any questions about how to fill it out?

POSSIBLE RESPONSES
If they have't returned the questionnaire because they don't understand it explain to them how to fill it out.

If angry at us for any reason try to pacify them and say that you regret any inconvenience that we may have caused them.

If the respondent just hasn't gotten around to filling it out yet, try to get commitment from them to fill it out soon.

If they haven't received a questionnaire yet say we will mail them another one. Be sure to get their correct address.

STEPS TO FOLLOW WHEN MAKING PHONE CALLS

1. Get card.
2. To dial phone number first dial 174 then listen for dial tone, then dial phone number that is on the card.
3. Read the above statement to the respondent.
4. On the back of the card write the respondent's reply, any action you took, the date and your initials. If you can't reach the respondent write down why (e.g., no answer), the date and your initials.
5. Go to the next card.

APPENDIX D

Mailed Questionnaire

MICHIGAN STATE UNIVERSITY

College of Communication Arts
Department of Communication

EAST LANSING • MICHIGAN • 48824

Dear

Recently you received a phone call from the Department of Communication at Michigan State University. In this phone call we asked your help in finding out the ways that television and radio affect how people communicate with each other. Our study is supported by the National Association of Broadcasters whose professional code is subscribed to by CBS, NBC, ABC, and the majority of the television and radio stations across the country. Your participation may lead to valuable information on the impact of television and radio on American life. In addition, the questionnaire may help you learn something about yourself and stimulate you to have some fresh insights into the situations that may be included. We really appreciate your agreeing to take some of your valuable time to help us.

Please read the following instructions carefully. Some of the questions that follow are difficult. They are difficult because they ask you to think about situations in novel ways. We would appreciate it if you would make every effort to answer the questions. If a question is confusing to you, then save the questionnaire and we will call you soon and give you assistance in answering the question. But please make every effort to answer the questions. When you finish place the questionnaire in the enclosed envelope and mail it to us at your earliest convenience. If you would like a report of the results of the study, write your name and address on the upper left hand corner of the envelope.

Again we would like to thank you for your willingness to take part in this effort. We believe your answers will be of great help in the continuing efforts to understand and solve important issues relating to the effects of television and radio on our society.

Sincerely,

J. David Johnson
Edward L. Fink
Sherrie L. Mazingo

1. In general do you like talking with others while you are watching television?

   Yes_____ No _____

2. What do you like about talking with others when you are watching television?

3. What do you dislike about talking with others when you are watching television?

4. In general do you like talking with others while you are listening to the radio?

   Yes_____ No _____

5. In general, on a scale of 1 (hurts a lot) to 10 (helps a lot), how would you rate the effect of television on your conversations with other people?

   ____

6. In general, on a scale of 1 (hurts a lot) to 10 (helps a lot), how would you rate the effect of radio on your conversations with other people?

   ____

7. Can you recall any habits that you have developed when you talk to others when viewing television?

8. Can you recall any habits that you have developed when you talk to others when listening to the radio?

A number of the questions that follow use a method for rating things with numbers that you may not be familiar with. This method may be difficult at first, but most people get the hang of it after answering a few questions. Here we will provide you with an example of how this method is used. In this example we will rate how comfortable people feel in different situations. If zero (0) is a complete lack of comfort and 100 is a typical amount of comfort, then how comfortable are you in the following situations? For this example we will use the feelings of a hypothetical Person X who will rate his degree of comfort in these situations.

	SITUATIONS		
	ON THE JOB	GIVING A SPEECH	AT HOME WITH FAMILY
AMOUNT OF COMFORT	Person X likes his job. He has been at it a long time. He feels a nearly average amount of comfort in this situation. So he rates it as a 112 in amount of comfort.	Person X has never given a speech. He doesn't like large crowds. He is shy. So he rates this situation as an 8 for amount of comfort.	Person X gets along well with his family. He feels very happy and secure with them. He rates this situation as a 345 for amount of comfort.

In answering these questions we will be just interested in the number you use to rate the situation. You don't have to provide verbal explanations. You can use any number you wish. In summary, this is the way you should answer these questions. First think of a typical amount (100) of and the absence of (0) what you are rating. Then compare the situation you are rating with the absence (0) and the typical amount (100). Then rate it (give it a number) based on this comparison.

---

9. If zero (0) is a complete absence of attention and 100 is how much attention you pay to things on the average, then what number would you use to describe your level of attention to each of the elements in the situations listed from left to right on the next page. Remember, you can use any number you wish.

AMOUNT OF ATTENTION TO ELEMENTS OF SITUATION

SITUATIONS

ELEMENTS OF SITUATIONS	VIEWING ENTERTAIN-MENT ON TV	VIEWING NEWS ON TV	LISTENING TO RADIO ENTERTAIN-MENT	LISTENING TO RADIO NEWS	WHEN NO TV OR RADIO IS PLAYING
OTHER PEOPLE	A.	B.	C.	D.	E.
THE TELEVISION	F.	G.			
THE RADIO			H.	I.	
THE PHYSICAL SETTING YOU ARE IN (For example, objects in the room, etc.)	J.	K.	L.	M.	N.
YOURSELF	O.	P.	Q.	R.	S.
OTHER ACTIVITIES THAT YOU ARE ENGAGED IN	T.	U.	V.	W.	X.

Please read the questions on the left hand side of this page and then answer them for each of the situations on the right hand side of the page. Use just <u>one number</u> to answer a question for each situation. A number of the following questions refer to a <u>typical situation</u>. We understand that answers to these questions often change depending on differing situations. What we mean by typical is your most common, usual, and normal experience with what is asked in the question. In other words, think what happens most of the time, rather than what happens in unusual situations.

QUESTIONS	A. VIEWING ENTERTAINMENT ON TV	B. VIEWING NEWS ON TV	C. LISTENING TO ENTERTAINMENT ON THE RADIO	D. LISTENING TO NEWS ON THE RADIO	E. WHEN NO TV OR RADIO IS ON
10. How many other <u>people</u> are typically with you in these situations?					
11. <u>Last week</u> how many <u>hours did</u> you spend in <u>each</u> of the following situations?					
12. How many other <u>activities</u> (for <u>example:</u> <u>sewing</u>, reading, etc.) are you typically engaged in in each of these situations? (number of activities)					
13. How many <u>hours</u> did you spend <u>last</u> week talking about things that happened in each of these situations when you were not actually in the situation?					

QUESTIONS	A. VIEWING ENTERTAINMENT ON TV	B. VIEWING NEWS ON TV	C. LISTENING TO ENTERTAINMENT ON THE RADIO	D. LISTENING TO NEWS ON THE RADIO	E. WHEN NO TV OR RADIO IS ON
14. How often in a typical hour are you provoked or stimulated by the things you see or hear on the media (television and radio) to make comments to others?					
15. If zero means a total lack of involvement and 100 is the average amount of involvement you feel in a typical situation, then what number describes how involved you are in each of these situations? You can use any number you wish.					
16. On a scale of 1 (very enjoyable) to 10 (very unenjoyable), how would you rate your conversations in each of these situations?					
17. On a scale of 1 (very critical) to 10 (very uncritical), how critical are you of the media (TV and radio) in conversations in these situations?					

QUESTIONS	A. VIEWING ENTERTAINMENT ON TV	B. VIEWING NEWS ON TV	C. LISTENING TO ENTERTAINMENT ON THE RADIO	D. LISTENING TO NEWS ON THE RADIO	E. WHEN NO TV OR RADIO IS ON
18. On a scale of 1 (very critical) to 10 (very uncritical), how critical are you of the other people who are with you in these situations?					

In the chart below aspects or parts of a conversation are listed on the left hand side of the page. Questions concerning these parts are given at the top of the chart. Please answer each question for each part. The following directions should be followed when answering these questions. If zero (0) is the complete absence of a particular property (e.g. importance, attention, change over time, or effects) and 100 is the typical or average amount of that property that exists in a normal conversation, then rate each part of the conversation for that property. For example, if you feel a particular part, say content, is nearly twice as important as the typical part of a conversation, then put down 195. If a part is nearly one-half as important, then put down 48. YOU CAN USE ANY NUMBER YOU WISH.

QUESTIONS

	IMPORTANCE	ATTENTION	CHANGE OVER TIME	EFFECTS OF PRESENCE OF TV AND RADIO	
	19. Parts of a conversation can be rated according to their importance. That is, how much they contribute to the conversation. How important are each of these parts to you in a typical conversation?	20. In a typical conversation you may pay more attention to some parts of the conversation than you do to others. How much attention do you pay to each of these parts in a typical conversation?	21. Parts of a conversation change over time. How much do each of these parts change in a typical conversation?	22. Parts of a conversation often change because of the effects of things in the situation upon them. How much are the parts of your typical conversation affected by the presence of:	
PARTS OF A CONVERSATION				A Television Playing?	A Radio Playing?
A. CONTENT: The things that you talk about.					
B. ATTENTION: How much you concentrate on any one thing.					
C. EMOTION: Your level of emotional feelings, such as love, fear, determination, etc.					
D. RESPONSIVENESS: The degree to which you feel others respond to what you say, are actually listening to what you say.					
E. CLOSENESS (INTIMACY): The degree to which you feel close or distant to others in this situation.					
F. PROCESS OF CONVERSING: Amount of conversation, pauses in conversation, interruptions, and ease of conversation.					

	QUESTIONS				
	19. (cont'd.) IMPORTANCE OF . . .	20. (cont'd.) ATTENTION TO . . .	21. (cont'd.) CHANGE OVER TIME IN . . .	22. (cont'd.) EFFECTS OF PRESENCE OF:	
PARTS OF A CONVERSATION (cont'd.)				A Television Playing?	A Radio Playing?
G. MEANING: Your understanding of the situation, your understanding of others, your understanding of what is said.					
H. ROLES: Knowledge of who you and other people are in terms of labels like friend, mother, spouse, etc.					
I. FORMALITY: The extent the situation is constrained, confined, formal, or predictable (as opposed to being spontaneous, informal, or loose).					
J. SELF-CENTEREDNESS: Extent to which you are the center of attention, all eyes directed at you, and all are thinking about what you are doing or thinking.					
K. CONVERSATION OPTIONS: When to listen, when to speak, what to listen to, and with whom to speak.					

The following questions ask for your ideas about the relationships between parts of conversations. For a more complete description of these parts refer to the preceding section. We are particularly interested in whether a change in one part of a conversation causes a change in another part of a conversation. For instance, does a change in emotion produce a change in closeness? Now if zero (0) indicates that a change in one thing doesn't produce a change in another and 100 is a moderate amount of change in one thing produced by another (for example, in an increase in the strength of the wind may cause a moderate degree of change in temperature), then indicate the amount of change that each of the following parts of conversation cause. You can use any number you wish. Please answer each blank in each column.

---

23. A change in EMOTION causes what degree of change in:

    A. PROCESS OF CONVERSING (amount, ease of conversation, etc.) _____
    B. MEANING (understanding what is said, the situation, etc.) _____
    C. CONVERSATION OPTIONS (when to listen, when to speak, etc.) _____
    D. CONTENT (the things you talk about) _____
    E. ROLES (knowledge of who people are in terms of labels) _____
    F. CLOSENESS (How distant you feel from others) _____
    G. FORMALITY (degree of constraint or predictabiltiy) _____
    H. ATTENTION (how much you concentrate on any one thing) _____

24. A change in CONTENT causes what degree of change in:

    A. MEANING _____
    B. CONVERSATION OPTIONS _____
    C. PROCESS OF CONVERSING _____
    D. ROLES _____
    E. CLOSENESS _____
    F. FORMALITY _____
    G. ATTENTION _____

25. A change in MEANING causes what degree of change in:

    A. CONVERSATION OPTIONS _____
    B. PROCESS OF CONVERSING _____
    C. ROLES _____
    D. CLOSENESS _____
    E. FORMALITY _____
    F. ATTENTION _____

26. A change in CONVERSATION OPTIONS causes what degree of change in:

    A. PROCESS OF CONVERSING _____
    B. ROLES _____
    C. CLOSENESS _____
    D. FORMALITY _____
    E. ATTENTION _____

27. A change in PROCESS OF CONVERSING causes what degree of change in:

    A. ROLES _____
    B. CLOSENESS _____
    C. FORMALITY _____
    D. ATTENTION _____

28. A change in ROLES causes what degree of change in:

    A. CLOSENESS _____
    B. FORMALITY _____
    C. ATTENTION _____

29. A change in CLOSENESS causes what degree of change in:

    A. FORMALITY _____
    B. ATTENTION _____

30. A change in FORMALITY causes what degree of change in:

    A. ATTENTION _____

QUESTIONNAIRE NUMBER________________

Now please answer the following questions about yourself. The answers to these questions will be kept strictly confidential and will be used only for statistical purposes.

31. How old are you? _____YEARS

32. Are you: MALE_____ FEMALE_____

33. Are you: AN ONLY CHILD_____ THE FIRST BORN_____ LATER BORN_____

34. Are you: SINGLE_____ MARRIED_____ WIDOWED_____ DIVORCED_____

35. How many people are you living with? _____NUMBER OF PEOPLE

36. Indicate if you are the head of the household, or how you are related to the head of the household.
    ____

37. How many radios are there in your household?_____

38. How many televisions are there in your household?_____

39. Who do you usually watch television with? (For example, son, father, etc.)
    ____

40. Do you normally view television on a color set? YES_____ NO_____

41. Approximately how many hours during the last week did you spend talking with other people informally when neither the radio nor television was on?
    ________HOURS

42. Would you call yourself a member of the: UPPER CLASS_____
    WORKING CLASS_____
    MIDDLE CLASS_____
    LOWER CLASS_____

43. What is your race? _____WHITE _____BLACK (NEGRO)
    _____ORIENTAL _____OTHER (PLEASE SPECIFY_____
    _____CHICANO(MEXICAN AMERICAN)
    _____NATIVE AMERICAN (AMERICAN INDIAN)

44. What is your occupation? ____________________________________

45. What is your annual income?______________

46. Are you currently employed? YES_____ NO_____

47. How many hours a week do you typically work? (including housework)

_____HOURS

48. How many years of schooling have you completed? _____YEARS

49. How many hours of free time do you have during a typical week?

_____HOURS

THANK YOU

APPENDIX E

Structural Equations for the Models in Matrix Form

APPENDIX E

Structural Equations for the Models in Matrix Form

I. Equations relating observed and true variables in the simple model (Model I).

A. The observed endogenous equations for all models.

$$\begin{pmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \\ y_5 \end{pmatrix} = \begin{pmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \\ \mu_4 \\ \mu_5 \end{pmatrix} + \begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & \lambda_1 & 0 & 0 \end{bmatrix} \begin{pmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{pmatrix} + \begin{pmatrix} 0 \\ 0 \\ 0 \\ \varepsilon_4 \\ \varepsilon_5 \end{pmatrix}$$

B. The observed exogenous in the radio and TV situations.

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{pmatrix} = \begin{pmatrix} \nu_1 \\ \nu_2 \\ \nu_3 \\ \nu_4 \end{pmatrix} + \begin{pmatrix} 0 & 1 \\ 0 & \lambda_2 \\ 0 & \lambda_3 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} \xi_1 \\ \xi_2 \end{pmatrix} + \begin{pmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ 0 \end{pmatrix}$$

C. The observed exogenous in the typical situation.

$$\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} \nu_1 \\ \nu_2 \end{pmatrix} + \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \begin{pmatrix} \xi_1 \\ \xi_2 \end{pmatrix} + \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

II. Equations for true endogenous variables in simple model.

A. Basic theoretical model (Model I).

$$\begin{bmatrix} 1 & 0 & -\alpha_{13} & 0 \\ -\alpha_{21} & 1 & 0 & -\alpha_{24} \\ 0 & 0 & 1 & 0 \\ 0 & 0 & -\alpha_{43} & 1 \end{bmatrix} \begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \\ \gamma_{31} & \gamma_{32} \\ \gamma_{41} & \gamma_{42} \end{bmatrix} \begin{bmatrix} \xi_1 \\ \xi_2 \end{bmatrix} + \begin{pmatrix} \zeta_1 \\ \zeta_2 \\ \zeta_3 \\ \zeta_4 \end{pmatrix}$$

B. Model with paths between emotion and content and between relationships and communication (Model II).

$$\begin{pmatrix} 1 & 0 & -\alpha_{13} & 0 \\ -\alpha_{21} & 1 & 0 & -\alpha_{24} \\ 0 & 0 & 1 & 0 \\ 0 & 0 & -\alpha_{43} & 1 \end{pmatrix} \begin{pmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{pmatrix} = \begin{bmatrix} \gamma_{11} & 0 \\ 0 & \gamma_{22} \\ \gamma_{31} & \gamma_{32} \\ \gamma_{41} & \gamma_{42} \end{bmatrix} \begin{vmatrix} \xi_1 \\ \xi_2 \end{vmatrix} + \begin{pmatrix} \zeta_1 \\ \zeta_2 \\ \zeta_3 \\ \zeta_4 \end{pmatrix}$$

C. Model with paths between all of the underlying and surface variables (Model III).

$$\begin{pmatrix} 1 & 0 & -\alpha_{13} & 0 \\ -\alpha_{21} & 1 & 0 & -\alpha_{24} \\ 0 & 0 & 1 & 0 \\ 0 & 0 & -\alpha_{43} & 1 \end{pmatrix} \begin{pmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{pmatrix} = \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \\ \gamma_{31} & \gamma_{32} \\ \gamma_{41} & \gamma_{42} \end{bmatrix} \begin{vmatrix} \xi_1 \\ \xi_2 \end{vmatrix} + \begin{pmatrix} \zeta_1 \\ \zeta_2 \\ \zeta_3 \\ \zeta_4 \end{pmatrix}$$

III. Equations relating observed and true variables in model with common variable.

A. Observed endogenous equations for all models.

$$\begin{pmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \\ y_5 \end{pmatrix} = \begin{pmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \\ \mu_4 \\ \mu_5 \end{pmatrix} + \begin{pmatrix} 0 & 0 & 1 & 0 & \lambda_1 \\ 1 & 0 & 0 & 0 & \lambda_2 \\ 0 & 0 & 0 & 1 & \lambda_3 \\ 0 & 1 & 0 & 0 & \lambda_4 \\ 0 & \lambda_5 & 0 & 0 & \lambda_6 \end{pmatrix} \begin{pmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \\ \eta_5 \end{pmatrix} + \begin{pmatrix} 0 \\ 0 \\ 0 \\ \varepsilon_4 \\ \varepsilon_5 \end{pmatrix}$$

B. The observed exogenous in the radio and TV situations.

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{pmatrix} = \begin{pmatrix} \nu_1 \\ \nu_2 \\ \nu_3 \\ \nu_4 \end{pmatrix} + \begin{pmatrix} 0 & 1 & \lambda_7 \\ 0 & \lambda_8 & \lambda_9 \\ 0 & \lambda_{10} & \lambda_{11} \\ & 0 & \lambda_{12} \end{pmatrix} \begin{pmatrix} \xi_1 \\ \xi_2 \\ \xi_3 \end{pmatrix} + \begin{pmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ 0 \end{pmatrix}$$

C. The observed exogenous variables in the typical situation.

$$\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} \nu_1 \\ \nu_2 \end{pmatrix} + \begin{pmatrix} 0 & 1 & \lambda_7 \\ 1 & 0 & \lambda_8 \end{pmatrix} \begin{pmatrix} \xi_1 \\ \xi_2 \\ \xi_3 \end{pmatrix} + \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

IV. Equations for true endogenous variables for all models with common variable.

$$\begin{bmatrix} 1 & 0 & -\alpha_{13} & 0 & 0 \\ -\alpha_{21} & 1 & 0 & -\alpha_{24} & 0 \\ 0 & 0 & -\alpha_{43} & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{pmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \\ \eta_5 \end{pmatrix} = \begin{pmatrix} \gamma_{11} & 0 & 0 \\ 0 & \gamma_{22} & 0 \\ \gamma_{31} & \gamma_{32} & 0 \\ {}_{41} & {}_{42} & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \xi_1 \\ \xi_2 \\ \xi_3 \end{pmatrix} + \begin{pmatrix} \zeta_1 \\ \zeta_2 \\ \zeta_3 \\ \zeta_4 \\ 0 \end{pmatrix}$$

APPENDIX F

Results of Tests of Model I in Typical and TV Situation

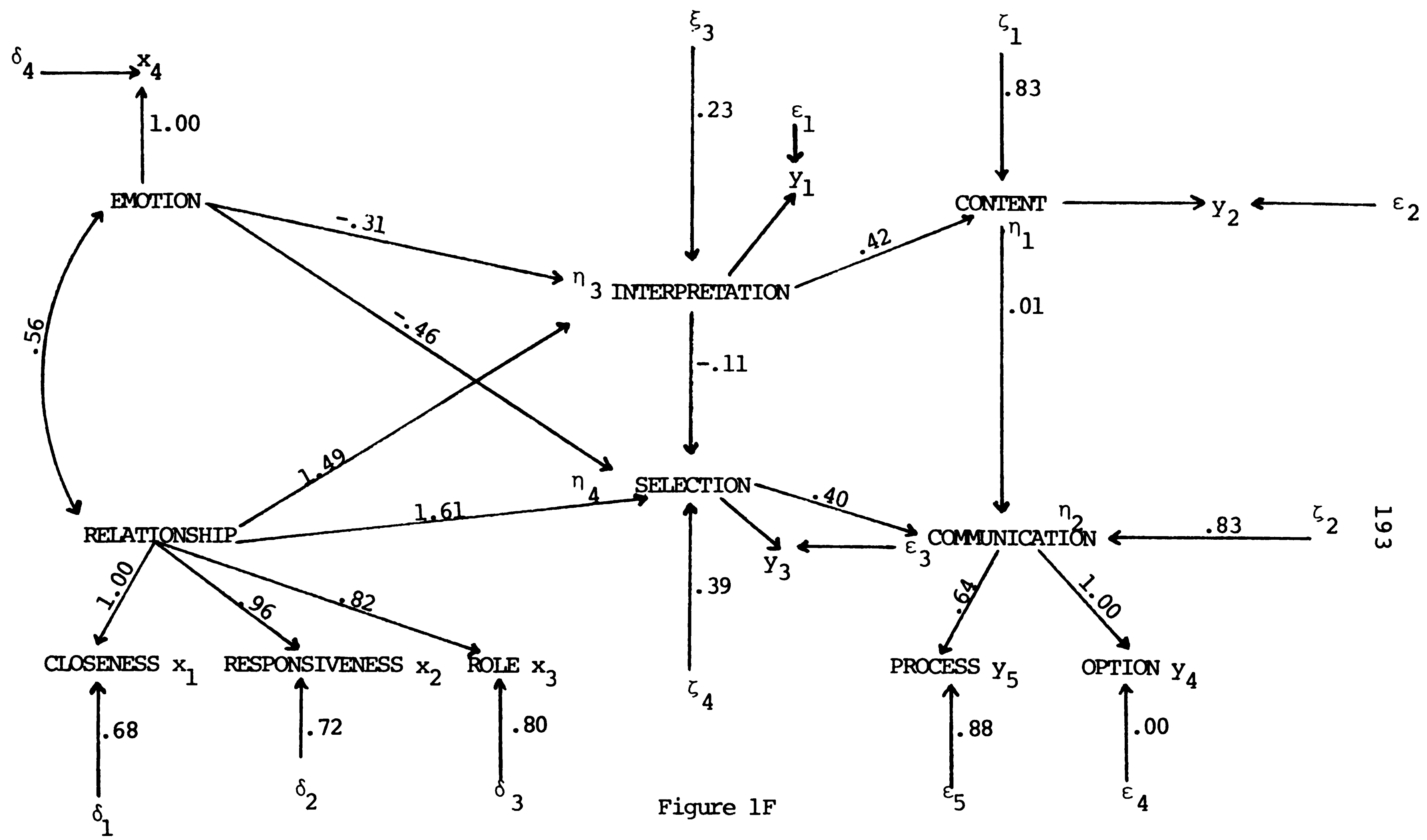

Figure 1F

Results for Model I in TV Situation*

*χ^2 = 130.92, df = 22, $p < .0001$

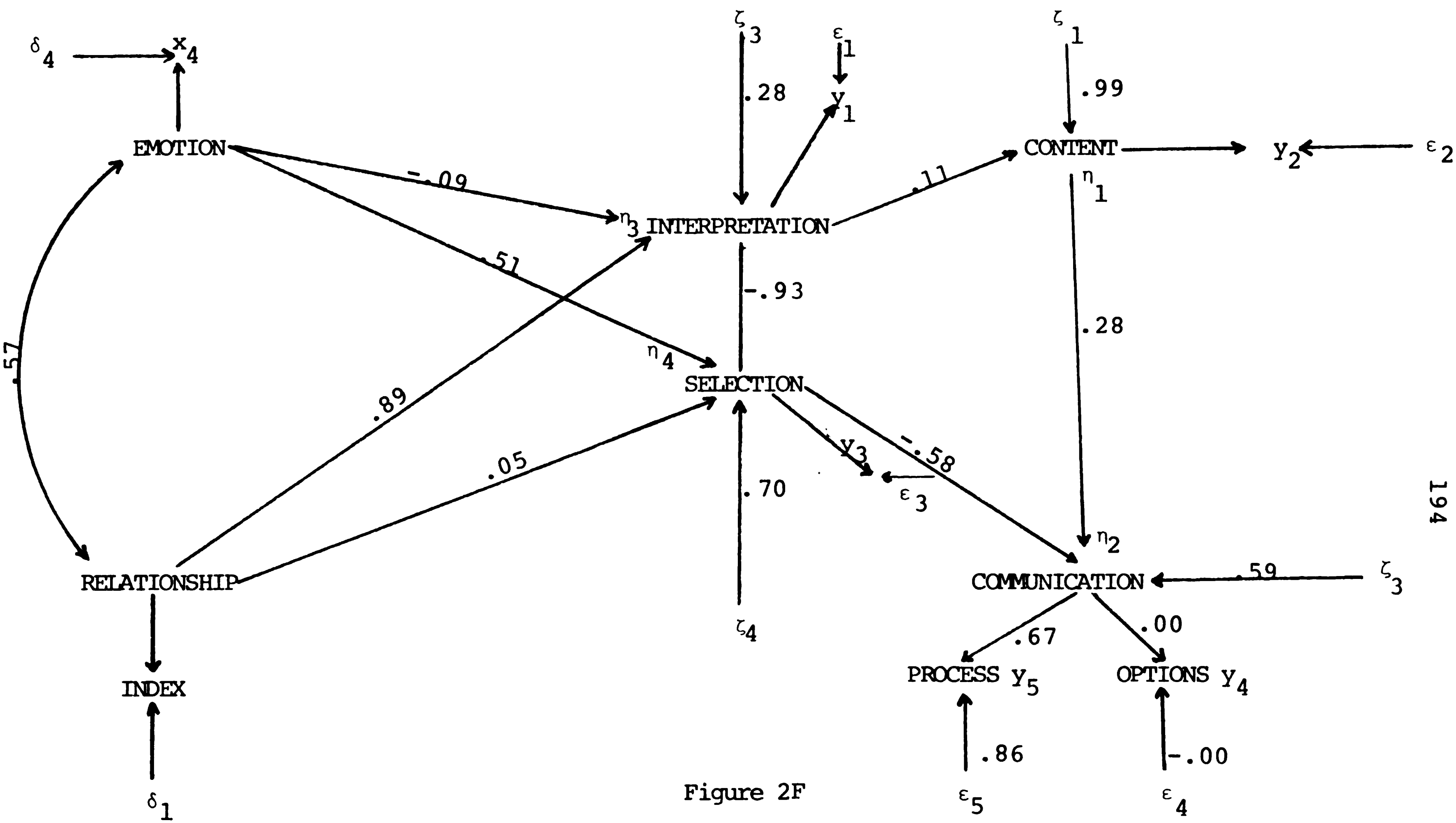

Figure 2F

Results for Model I in Typical Situation*

* $\chi^2 = 197.04$, df = 10, $p < .0001$

APPENDIX G

Maximum Likelihood Solutions for Models Tested in Dissertation

Appendix G

Maximum Likelihood Solutions for Models Tested in Dissertation

Introduction

In this appendix the computer printouts of the various tests of the models will be presented. Before the printouts are presented each of the matrices contained in them will be briefly explained. This appendix presents the results of the LISREL tests reported elsewhere in the dissertation in a slightly different format.

Figure 3 (in text) contains the operational version of the model developed in Chapter I with appropriate LISREL labels for the parameters. The two exogenous variables in the model are emotion (ζ_1) and relationships (ξ_2). The observed variables that are indicants of the true exogenous variables were described in detail in Chapter II. Emotion only has a single observed indicant, x_4. Relationship has three observed indicants: closeness, x_1; responsiveness, x_2; and role, x_3. This information is used to construct the matrix lambda x of observed exogenous indicants which will be the same in every television and radio model, I through III. Lambda x is presented below:

$$\Lambda \quad x = \begin{bmatrix} 0 & \lambda_6 \\ 0 & \lambda_7 \\ 0 & \lambda_8 \\ \lambda_9 & 0 \end{bmatrix}$$

The 0's in all of the matrices represent zero's or parameters that aren't estimated by the program. λ_6 and λ_9 in this model are reference indicators for relationships and for emotion respectively. Their values are always fixed at 1. λ_7 and λ_8 are ordinary indicators that are free to vary and thus will be estimated by the program (Schoenberg, 1972). These ordinary indicators represent the scale factors of these variables.

The true endogenous variables in Figure 3 are content (η_1), communication (η_2), interpretation (η_3), and selection (η_4). There is only one observed indicator for content (y_2), interpretation (y_1) and selection (y_3). Communication has two observed indicants; conversation options (y_4) and process of conversation (y_5). The matrix lambda y which contains the indicators of the true variables follows:

$$\Lambda_y = \begin{bmatrix} 0 & 0 & \lambda_1 & 0 \\ \lambda_2 & 0 & 0 & 0 \\ 0 & 0 & 0 & \lambda_3 \\ 0 & \lambda_4 & 0 & 0 \\ 0 & \lambda_5 & 0 & 0 \end{bmatrix}$$

In all the models λ_1 to λ_4 have a fixed value of 1. λ_5 is the only parameter in Λ_y that is estimated.

The A(Beta in printout) matrix contains the paths between the true endogenous variables. The diagonal element of each row of this matrix has a value of 1. The basic model only estimates 4 of the 12 possible paths between endogenous true variables in this model. These paths are labeled α's in the matrix. The actual A matrix is:

$$A = \begin{bmatrix} 1 & 0 & \alpha_{13} & 0 \\ \alpha_{21} & 1 & 0 & \alpha_{24} \\ 0 & 0 & 1 & 0 \\ 0 & 0 & \alpha_{43} & 1 \end{bmatrix}$$

The gamma matrix contains the paths between the true exogenous variables and the true endogenous variables. These paths are labeled with γ. In Model I there are only 4 paths between true exogenous and endogenous variables; although in some models that will be tested additional paths will be added to this matrix. All of the paths in this model will be estimated by LISREL. The gamma matrix is:

$$\Gamma = \begin{bmatrix} 0 & 0 \\ 0 & 0 \\ \gamma_{31} & \gamma_{32} \\ \gamma_{41} & \gamma_{42} \end{bmatrix}$$

Phi (Φ) is the variance-covariance matrix of the exogenous variables. The on-diagonal elements of the matrix represent the variances and the off-diagonal elements the covariances. All of these parameters will be estimated by LISREL where possible.

Psi (ψ) is the variance-covariance matrix of the residuals, zeta (ζ), of the endogenous variables. In one set of models (labeled a) only the variances of the residuals will be estimated by means of LISREL. In the other set of models (labeled b) all of the parameters within this matrix will be estimated.

$$\psi = \begin{bmatrix} \sigma^2_{\zeta_1} & & & \\ 0 & \sigma^2_{\zeta_2} & & \\ 0 & 0 & \sigma^2_{\zeta_3} & \\ 0 & 0 & 0 & \sigma^2_{\zeta_4} \end{bmatrix}$$

The last two matrices, θ_ε and θ_δ, represent the diagonals of the measurement error standard deviations of the observed indicators. This feature builds into LISREL the assumption of uncorrelated errors of measurement (Jöreskog and Van Thillo, 1972). The measurement error standard deviations for the single indicators of variables will not be estimated in this matrix in any of the models tested. The measurement errors associated with these single indicators will be contained in the residuals of the single indicators true variables in the psi matrix. If this procedure is not followed there are problems with identification, since one piece of information would be used to estimate two different parameters. The error of measurements standard deviations estimated by LISREL for the observed endogenous indicators will be the same in every model. Thus θ_{ε} will assume the following form:

$$\theta_{\varepsilon} = [0 \quad 0 \quad 0 \quad \sigma_{\varepsilon_4} \quad \sigma_{\varepsilon_5}]$$

The errors of measurement standard deviations associated with the exogenous observed variables will be the same for the television and radio models and θ_{δ} will assume the following form:

$$\theta_{\delta} = [\sigma_{\delta_1} \quad \sigma_{\delta_2} \quad \sigma_{\delta_3} \quad 0]$$

APPENDIX G

Table 1G

Maximum Likelihood Solution for Model Ia in Radio Situation with Off-Diagonal Elements of PSI Matrix Fixed at Zero

LAMBDA Y

	1	2	3	4
1	0.000	0.000	1.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.000	1.000
4	0.000	1.000	0.000	0.000
5	0.000	.763	0.000	0.000

LAMBDA X

	1	2
1	0.000	1.000
2	0.000	.919
3	0.000	.831
4	1.000	0.000

BETA

	1	2	3	4
1	1.000	0.000	-.536	0.000
2	-.054	1.000	0.000	-.656
3	0.000	0.000	1.000	0.000
4	0.000	0.000	.201	1.000

GAMMA

	1	2
1	0.000	0.000
2	0.000	0.000
3	-.408	1.420
4	.131	.895

PHI

	1	2
1	1.000	
2	.606	.654

PSI

	1	2	3	4
1	.713			
2	0.000	.167		
3	0.000	0.000	.218	
4	0.000	0.000	0.000	.546

Table 1G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.000	0.000	0.000	.603	.794

THETA DELTA

	1	2	3	4
1	.589	.669	.741	0.000

Table 2G

Maximum Likelihood Solution for Model IIa with Paths Between Emotion and Content and Relationship and Communication with Off-Diagonal Elements of PSI Matrix Fixed at Zero in Radio Situation

LAMBDA Y

	1	2	3	4
1	0.000	0.000	1.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.000	1.000
4	0.000	1.000	0.000	0.000
5	0.000	1.099	0.000	0.000

LAMBDA X

	1	2
1	0.000	1.000
2	0.000	.867
3	0.000	.824
4	1.000	0.000

BETA

	1	2	3	4
1	1.000	0.000	-.305	0.000
2	.192	1.000	0.000	-.146
3	0.000	0.000	1.000	0.000
4	0.000	0.000	.418	1.000

GAMMA

	1	2
1	.510	0.000
2	0.000	.906
3	-.331	1.368
4	.103	1.166

PHI

	1	2
1	1.000	
2	.572	.664

PSI

	1	2	3	4
1	.505			
2	0.000	-.122		
3	0.000	0.000	.166	
4	0.000	0.000	0.000	.513

Table 2G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.000	0.000	0.000	.747	.683

THETA DELTA

	1	2	3	4
1	.580	.708	.741	0.000

Table 3G

Maximum Likelihood Solution For Model IIb with Paths Between Emotion and Content and Relationship and Communication with Off-Diagonal Elements of PSI Matrix Free in the Radio Situation

LAMBDA Y

	1	2	3	4
1	0.000	0.000	1.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.000	1.000
4	0.000	1.000	0.000	0.000
5	0.000	1.140	0.000	0.000

LAMBDA X

	1	2
1	0.000	1.000
2	0.000	.910
3	0.000	.825
4	1.000	0.000

BETA

	1	2	3	4
1	1.000	0.000	-.357	0.000
2	.591	1.000	0.000	-.373
3	0.000	0.000	1.000	0.000
4	0.000	0.000	.246	1.000

GAMMA

	1	2
1	.487	0.000
2	0.000	1.047
3	-.399	1.402
4	.119	.945

PHI

	1	2
1	1.000	
2	.687	.661

PSI

	1	2	3	4
1	.507			
2	.207	.033		
3	-.041	.067	.220	
4	.039	-.081	.012	.548

Table 3G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.000	0.000	0.000	.758	.668

THETA DELTA

	1	2	3	4
1	.582	.673	.742	0.000

Table 4G

Maximum Likelihood Solution for Model IIIa with Paths Between Underlying and Surface Variables with Off-Diagonal Elements of PSI Matrix Fixed at Zero in Radio Situation

LAMBDA Y

	1	2	3	4
1	0.000	0.000	1.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.000	1.000
4	0.000	1.000	0.000	0.000
5	0.000	1.135	0.000	0.000

LAMBDA X

	1	2
1	0.000	1.000
2	0.000	.922
3	0.000	.834
4	1.000	0.000

BETA

	1	2	3	4
1	1.000	0.000	-.007	0.000
2	.170	1.000	0.000	-.138
3	0.000	0.000	1.000	0.000
4	0.000	0.000	.432	1.000

GAMMA

	1	2
1	.293	.582
2	-.156	1.085
3	-.486	1.549
4	-.037	1.344

PHI

	1	2
1	1.000	
2	.605	.630

PSI

	1	2	3	4
1	.487			
2	0.000	-.123		
3	0.000	0.000	.164	
4	0.000	0.000	0.000	.511

Table 4G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.000	0.000	0.000	.757	.670

THETA DELTA

	1	2	3	4
1	.608	.682	.749	0.000

Table 5G

Maximum Likelihood Solution for Model IIIb with Paths Between Underlying and Surface Variables with Off-Diagonal Elements of PSI Matrix Free in Radio Situation

LAMBDA Y

	1	2	3	4
1	0.000	0.000	1.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.000	1.000
4	0.000	1.000	0.000	0.000
5	0.000	1.140	0.000	0.000

LAMBDA X

	1	2
1	0.000	1.000
2	0.000	.910
3	0.000	.825
4	1.000	0.000

BETA

	1	2	3	4
1	1.000	0.000	-.353	0.000
2	.135	1.000	0.000	-.571
3	0.000	0.000	1.000	0.000
4	0.000	0.000	.242	1.000

GAMMA

	1	2
1	.486	.005
2	-.206	.700
3	-.399	1.402
4	.121	.941

PHI

	1	2
1	1.000	
2	.607	.661

PSI

	1	2	3	4
1	.507			
2	-.027	-.005		
3	-.040	.059	.220	
4	.039	-.209	.011	.548

Table 5G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.000	0.000	0.000	.758	.668

THETA DELTA

	1	2	3	4
1	.582	.673	.742	0.000

Table 6G

Maximum Likelihood Solution for Model II
in Typical Situation

LAMBDA Y

	1	2	3	4
1	0.000	0.000	1.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	1.000	0.000	1.000
4	0.000	1.000	0.000	0.000
5	0.000	.806	0.000	0.000

LAMBDA X

	1	2
1	0.000	1.000
2	1.000	0.000

BETA

	1	2	3	4
1	1.000	0.000	.144	0.000
2	-.016	1.000	0.000	.157
3	0.000	0.000	1.000	0.000
4	0.000	0.000	.716	1.000

GAMMA

	1	2
1	.598	0.000
2	0.000	.781
3	-.087	.892
4	.506	-.138

PHI

	1	2
1	1.000	
2	.567	1.000

PSI

	1	2	3	4
1	.694			
2	0.000	.129		
3	0.000	0.000	.284	
4	0.000	0.000	0.000	.618

Table 6G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.000	0.000	0.000	.369	.654

THETA DELTA

	1	2
1	0.000	0.000

Table 7G

Maximum Likelihood Solution for Model II
in TV Situation

LAMBDA Y

	1	2	3	4
1	0.000	0.000	1.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.000	1.000
4	0.000	1.000	0.000	0.000
5	0.000	.640	0.000	0.000

LAMBDA X

	1	2
1	0.000	1.000
2	0.000	.874
3	0.000	.681
4	1.000	0.000

BETA

	1	2	3	4
1	1.000	0.000	-.328	0.000
2	.157	1.000	0.000	.192
3	0.000	0.000	1.000	0.000
4	0.000	0.000	-.277	1.000

GAMMA

	1	2
1	.162	0.000
2	0.000	1.187
3	.045	.921
4	-.118	.676

PHI

	1	2
1	1.000	
2	.533	.682

PSI

	1	2	3	4
1	.809			
2	0.000	.364		
3	0.000	0.000	.376	
4	0.000	0.000	0.000	.473

Table 7G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.000	0.000	0.000	.000	.768

THETA DELTA

	1	2	3	4
1	.564	.692	.827	0.000

Table 8G

Maximum Likelihood Solution for Model IV with Common Variable in Radio Situation

LAMBDA Y

	1	2	3	4	5
1	0.000	0.000	1.000	0.000	.518
2	1.000	0.000	0.000	0.000	-.062
3	0.000	0.000	0.000	1.000	-.385
4	0.000	1.000	0.000	0.000	-.185
5	0.000	1.034	0.000	0.000	.296

LAMBDA X

	1	2	3
1	0.000	1.000	.124
2	0.000	.866	-.202
3	0.000	.729	.164
4	1.000	0.000	-.337

BETA

	1	2	3	4	5
1	1.000	0.000	-.431	0.000	0.000
2	.138	1.000	0.000	-.320	0.000
3	0.000	0.000	1.000	0.000	0.000
4	0.000	0.000	-1.819	1.000	0.000
5	0.000	0.000	0.000	0.000	1.000

GAMMA

	1	2	3
1	.403	0.000	0.000
2	0.000	.681	0.000
3	.039	.868	0.000
4	-.212	-.733	0.000
5	0.000	0.000	1.000

PHI

	1	2	3
1	1.000		
2	.832	1.000	
3	0.000	0.000	1.000

PSI

	1	2	3	4	5
1	.498				
2	0.000	-.061			
3	0.000	0.000	.077		
4	0.000	0.000	0.000	.165	
5	0.000	0.000	0.000	0.000	0.000

Table 8G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.000	0.000	0.000	.666	.595

THETA DELTA

	1	2	3	4
1	.568	.596	.738	0.000

Table 9G

Maximum Likelihood Solution for Model IV
with Common Variable in Typical Situation

LAMBDA Y

	1	2	3	4	5
1	0.0	0.0	1.000	0.0	0.902
2	1.000	0.0	0.0	0.0	-0.271
3	0.0	0.0	0.0	1.000	0.025
4	0.0	1.000	0.0	0.0	0.845
5	0.0	1.253	0.0	0.0	0.625

LAMPDA X

	1	2	3
1	0.0	1.000	0.744
2	1.000	0.0	0.235

BETA

	1	2	3	4	5
1	1.000	0.0	-1.549	0.0	0.0
2	-0.121	1.000	0.0	-0.137	0.0
3	0.0	0.0	1.000	0.0	0.0
4	0.0	0.0	-0.101	1.000	0.0
5	0.0	0.0	0.0	0.0	1.000

GAMMA

	1	2	3
1	0.296	0.0	0.0
2	0.0	0.260	0.0
3	0.094	0.304	0.0
4	0.393	0.470	0.0
5	0.0	0.0	1.000

PHI

	1	2	3
1	0.945		
2	0.393	0.447	
3	0.0	0.0	1.000

PSI

	1	2	3	4	5
1	0.204				
2	0.0	-0.011			
3	0.0	0.0	0.115		
4	0.0	0.0	0.0	0.574	
5	0.0	0.0	0.0	0.0	0.0

Table 9G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.0	0.0	0.0	0.410	0.652

THETA DELTA

	1	2
1	0.0	0.0

Table 10G

Maximum Likelihood Solution for Model IV
with Common Variable in TV Situation

LAMBDA Y

	1	2	3	4	5
1	0.000	0.000	1.000	0.000	-.353
2	1.000	0.000	0.000	0.000	.161
3	0.000	0.000	0.000	1.000	.184
4	0.000	1.000	0.000	0.000	.229
5	0.000	.588	0.000	0.000	.362

LAMBDA X

	1	2	3
1	0.000	1.000	-.074
2	0.000	.877	-.130
3	0.000	.682	-.363
4	1.000	0.000	-.627

BETA

	1	2	3	4	5
1	1.000	0.000	-.343	0.000	0.000
2	.602	1.000	0.000	1.043	0.000
3	0.000	0.000	1.000	0.000	0.000
4	0.000	0.000	-1.666	1.000	0.000
5	0.000	0.000	0.000	0.000	1.000

GAMMA

	1	2	3
1	.546	0.000	0.000
2	0.000	2.788	0.000
3	-.995	1.883	0.000
4	1.640	-2.077	0.000
5	0.000	0.000	1.000

PHI

	1	2	3
1	.606		
2	.487	.578	
3	0.000	0.000	1.000

PSI

	1	2	3	4	5
1	.573				
2	0.000	-.492			
3	0.000	0.000	.051		
4	0.000	0.000	0.000	.193	
5	0.000	0.000	0.000	0.000	0.000

Table 10G (cont'd.)

THETA EPS

	1	2	3	4	5
1	0.000	0.000	0.000	.000	.736

THETA DELTA

	1	2	3	4
1	.645	.734	.774	0.000

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