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EFFECTS OF COGNITIVE COMPATIBILITY
ON COMMUNICATIVE ACCURACY

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Harold James Kinzer, A.B.

The Ohio State University
1972

Approved by

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CHAPTER I
INTRODUCTION

Introduction to the Problem

Common to many, if not all, theories of communication is the assumption that the greater the degree of some kind of relevant commonality between the communication source and receiver the greater the likelihood of communication success. Berlo's discussion of this idea is typical of that of many communication theorists. He argues that meaning is not in the message, but in the covert responses of a person to the message. Thus, meanings are in people, not in messages. "To the extent that people have similar meanings, they can communicate. If they have no similarities in meanings between them, they cannot communicate."¹ According to Berlo, the relevant commonality necessary for communication success is similarity of meaning which results either from similarity of experience or from the ability to anticipate similar experiences.²

²Ibid., p. 184.
communication has been suggested by both observation and empirical research. For example, the importance of cultural similarities to communication success is made apparent in Hall's dramatic discussion of communication difficulties arising during cross-cultural communication. He observed that even time and space have different meanings for members of different cultures. Within a common culture, Harms found that communication accuracy as measured by the cloze procedure was greater when both communicator and receiver were from the same socio-economic group. Similarly, Vick and Wood found that subjects who were similar in terms of family background, formative environment, and education communicated more successfully in a "password" game than did pairs of highly dissimilar subjects.

Even more interesting than this simple correlation of experience to predict communication success is the notion that people can develop similar meanings if they are able to anticipate similar experiences. In

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the development of communication theory, two somewhat different approaches to this notion appear to have emerged. The first approach is that through knowledge of human behavior, audience analysis, feedforward, and feedback one is able to make some reasonably accurate predictions about how others will respond to one's communication. One is able to make these predictions because one, in effect, is able to anticipate the experience of the other. Successful predictions enable one to frame messages that will elicit an intended meaning within the other. It is, of course, recognized that relevant similarities between communicator and receiver can increase the accuracy of these predictions and thus enhance the effectiveness of the audience adaptation. It is not assumed, however, that two individuals must be similar to communicate effectively.

The second approach holds that two individuals can anticipate similar experiences if they are psychologically similar in relevant ways. Psychological is used here to refer to such constructs as attitude, value, cognition, and personality. The focus of the first approach is largely on similar demographic characteristics. Psychological characteristics are used here in contrast to demographic characteristics. It is important to realize that psychological similarity is
not necessarily dependent upon similarity of experience. It is apparently assumed that two individuals who are psychologically similar can communicate effectively with each other without much conscious adaptation of messages to the other.

These two approaches differ in the sense that the first approach stresses that one must make an effort to understand the other, to predict the other's responses to potential messages, to learn to anticipate similar experiences. The second approach assumes that individuals who are psychologically similar need make little conscious effort to anticipate similar experiences. This is viewed as an almost automatic process.

These two approaches are certainly not rival explanations of communication effectiveness. They are not even clearly distinct approaches, for there is a considerable amount of overlap between them. These two approaches simply represent different research foci, and to some extent, different assumptions about communication. As such, these two approaches provide a useful framework for discussion of the theory and research relevant to the specific research problem to be posed in this chapter.

The first approach has been well-developed in numerous speech textbooks. Speech educators have long
insisted that, within limits, it is possible to communicate successfully with a dissimilar individual if one's communication is well-adapted to that individual. Baird, Knower, and Becker direct the speaker

... to change your communication behaviors to meet the needs and desires of the audience. This means that you must understand those with whom you talk; you must become sensitive to their needs and put yourself in their shoes, because your effectiveness as a speaker will depend on far more than your ideas alone; it will depend to a very large extent on the identification of your listeners with you and your message.6

Similarly, Keltner concludes that "the more I know about you and the more you know about me, the more effective and efficient will be our communication attempts."7 Keltner cautions, however, that one cannot actually view and respond to the world exactly as the other person does. Instead, "when I speak to you, I am talking to a hypothesis or an estimation that I have about you and about what you are."8

Carl Rogers points out that the ability "to sense the client's inner world of private personal

8 Ibid., p. 52.
meanings as if it were your own, but without ever losing the 'as if' quality ..." is essential to successful therapeutic communication.\(^9\) When the counselor attains this understanding of the client's world "... he can both communicate his understanding of what is vaguely known to the client, and he can also voice meanings in the client's experience of which the client is scarcely aware."\(^{10}\)

This approach, whether advocated by speech educators or clinical psychologists, emphasizes that one can acquire the ability to anticipate similar experiences. Both through formal instruction and practice one can learn to analyze and adapt to the audience, to respond appropriately to feedback, and to become empathic.

The second approach, on the other hand, would have researchers focus on identifying what similarity of psychological variables in what situations determine communication success. Such research might eventually lead us to the conclusion that for some situations communicators would have to be matched on relevant psychological variables to ensure maximum effective


\(^{10}\)Ibid., p. 419.
communication. For example, it might be found that such a matching of students and teachers would increase the efficiency of classroom learning.

Kelly has developed a theory of personality which offers a means of conceptualizing this approach. His fundamental postulate is that "a person's processes are psychologically channelized by ways in which he anticipates events." Eleven corollaries serve to elaborate this fundamental postulate. The final two corollaries are particularly relevant to this discussion.

Commonality Corollary: To the extent that one person employs a construction of experience which is similar to that employed by another, his psychological processes are similar to those of the other person.

Sociality Corollary: To the extent that one person construes the construction processes of another, he may play a role in a social process involving the other person.11

According to this theory, an individual's prediction (anticipation) of events is the product of those replications of which he is aware within a series of events and of his unique interpretations of these replications. "Construing" is used by Kelly in the sense of


12 Ibid., p. 104.
an interpretation which need not ever be a verbal formulation. This process of construing creates a unique structure or channel of operation. The construct which is the result of this construction process is conceptualized as a dimension. A construct is formed when a person notes that an aspect of two events is similar but stands in contrast to that aspect in a third event. The result is a bi-polar dimension. For example, an individual may form a construct by deciding that two individuals are alike because they are ethical and a third individual is different because he is unethical. The resulting bi-polar dimension is ethical-unethical.

It is important to emphasize that two people will have similar psychological processes only to the extent that they have similar constructions of experience. This holds even if their experiences are completely different. It is the construction process and not the identity of experiences which is important. Thus, two people could experience the same event, but would have very different psychological processes because they have construed the event differently. For example, if two individuals could observe the same instances of behavior of other people over a period of

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\(^{13}\text{Ibid.}, pp. 50-51, 59-61.\)

\(^{14}\text{Ibid.}, pp. 90-91.\)
time, they would both interpret each instance of behavior and would become aware of regularities among the behavior. Let us say that each individual has interpreted the behavior differently so he observes different regularities of behavior. As a result of differing constructions of these events, each of the two individuals would respond to people in a different way.

Although Kelly sees no necessity for the concept of cognition, his theory appears to be essentially cognitive in nature. It is cognitive in that it assumes that (1) each person formulates his own way of "viewing" the world, (2) each person frequently alters his constructs and reorganizes his construct systems, (3) each person must choose from among alternative constructs, and (4) each person tests his constructs to determine their predictive efficiency. Kelly's construction process is essentially a process of transforming, elaborating, storing, and using inputs from the environment. It is this process which Neisser has labeled as cognitive.

If our ability to communicate effectively depends to a significant degree upon our ability to anticipate similar experiences, then Kelly's theory is

15 Ibid., pp. 8-15.
particularly useful for it focuses specifically on
this process of anticipating similar experiences.
Since this appears to be primarily a cognitive process,
it is contended here that if two individuals employ
similar cognitive processes they will respond in similar
ways to a message. That is, the message will elicit
similar meanings. Therefore, it will be hypothesized
here that cognitive similarity will facilitate communi-
cation.

A definition of cognition popular among social
psychologists and communication theorists is that of
Festinger. He has defined cognition as "... any
knowledge, opinion, or belief about the environment,
about oneself, or about one's behavior."¹⁷ Certainly,
belief or opinion similarity between individuals would
be expected to facilitate communication. However, it
will be argued in the next chapter that individuals
could hold dissimilar opinions and beliefs and still
have similar cognitive processes. That is, conflicting
beliefs could be generated by similar cognitive processes.
Therefore, it is assumed here that individuals are cog-
nitively similar if their cognitive processes are sim-
ilar.

¹⁷Leon Festinger, A Theory of Cognitive Dis-
sonance (Stanford, California: Stanford University
Cognition is defined here with the emphasis on the processes involved in the development of knowledge, beliefs, and opinions. Triandis has defined cognition as

the subfield of psychology that is concerned with the laws determining how organisms know the world around them. It subsumes perception, recognition, retention, imagination, meaning, associations, and attitudes, as well as concept formation and problem solving.¹⁸

Similarly, Neisser has defined cognition as

All the processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used. . . . Such terms as sensation, perception, imagery, retention, recall, problem-solving, and thinking, among many others, refer to hypothetical states or aspects of cognition.¹⁹

One aspect of the cognitive process is the focus of the present study. It will be hypothesized here that communication will be facilitated among individuals who employ similar cognitive dimensions.

"A dimension . . . is a quantitative or qualitative ordering of objects or occurrences according to some singular unitary principle . . . ."²⁰ It is assumed

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¹⁹Neisser, Cognitive Psychology, p. 4.

that individuals employ dimensions in their processing of messages and other inputs. One would expect individuals who process inputs along similar dimensions to communicate effectively with each other because they would be able to predict each other's responses. This point will receive further development later in this chapter and in the following chapter.

Certainly cognitive similarity is not the only psychological variable that could be expected to enable individuals to anticipate similar experiences. Winter, for example, found a high correlation between student-instructor value similarity and achievement in class. He concluded that as the result of value dissimilarity "the poor student probably finds it difficult to understand, identify with, and learn from his professor."\(^{21}\) In a classic study of rumor transmission, Allport and Postman discovered that as a narrative is passed from individual to individual it is dramatically altered, apparently to make the narrative consistent with the individual's attitudes. There is an obvious loss of fidelity in the message as it is transmitted between individuals who hold somewhat different attitudes.

Allport and Postman concluded that information which is

inconsistent with an individual's attitudes is likely to be "recast to fit not only his span of comprehension and retention, but, likewise, his own personal needs and interests.\textsuperscript{22} To some extent, Everett Rogers' study of diffusion of innovation is also relevant here. He observed that one's social orientation—cosmopolite, localite, or semi-isolate—determined to what sources of information one would respond and how one would respond to this information.\textsuperscript{23}

Cognitive similarity, which is a potentially important explanation of communication success, has received relatively little study. Several theorists, however, have attempted to explain how cognitive similarity is thought to facilitate communication.

McGuire, for example, has developed a theory of dyadic communication in which cognitive structure is used to explain the rapid, almost automatic conversational exchanges within a dyad.

The observation of rapid and to the point conversation exchanges leads us to two related concepts. The first is that elaborate, already established quasipermanent cognitive structures must exist . . . and need only be "initiated"


to go into full operation in most conversations.  

... [Second] If such structures can be initiated by verbal input, then what a person will understand and say at any moment in a conversation can be predicted provided the structure in use can be described.  

It is the second concept—the possibility of predicting what will be understood—that is of most interest to the present discussion.

There are two aspects of this cognitive structure—modes and models. Modes are behavior rules which guide and limit the options for conversation behavior as well as simplify and paraphrase verbal input. Models are “established sets of rules for content interpretation.” As such, "models contain rules for cause and effect relationships, for the likely sequences of events, and for determining what information is important."  

Shared models (1) speed up communication because "details, possible consequences of events, etc., which are well known to both participants need not be spelled out" and (2) permit two individuals to

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26 Ibid., p. 231.

27 Ibid., p. 232.
understand each other. 28 Although a dyadic communication may be guided by similar modes, dissimilar models will not permit adequate understanding to develop.

For example, former President Lyndon Johnson's retirement announcement was equally well interpreted in a number of different ways, and, since vocabularies, etc., were similar, discussions about the event often continued for a long period before model discrepancies became apparent. 29

McGuire contended that if we are to predict what an individual understands from a communication, we must be able to identify which shared models are relevant to the communication. Such an undertaking might be hampered because we have only a rudimentary understanding of what a model is.

Runkel has likened communication to a process of map matching. Runkel's maps bear some similarity to McGuire's models. Runkel has argued that in a communication situation a set of cognitive dimensions "provide the frame of reference or the 'latitude and longitude,' so to speak, upon which cognized objects are mapped." 30 The communicator produces his message from within his set of relevant dimensions; the receiver

28 Ibid., p. 235.
29 Ibid., p. 233.
30 Philip J. Runkel, "Dimensionality, Map Matching, and Anxiety," Psychological Reports, XIII (1963), 336.
interprets the message with the set of cognitive dimensions which to him is relevant in this situation. The more similar the two sets of cognitive dimensions, the more effective the communication. Communication is analogous to map matching. Two individuals can communicate successfully about a piece of terrain only to the extent that their individual maps of the terrain overlap.

Kelly's theory of personality, which has already been introduced, can also be interpreted as support for the contention that similarity of cognitive dimensions facilitates communication. Three assumptions about the role of cognition in communication can be derived from Kelly's theory. First, that as the result of experience one develops unique models for the interpretation of events and messages. As a result, different individuals will interpret the same message differently. Second, communication will be effective only to the extent that the communicating individuals share similar interpretation models. Third, cognition can be usefully conceived as dimensional in nature.

Several previous researchers appear to have adopted these three assumptions in their efforts to test the general hypothesis that cognitive similarity

\[^{31}\text{Ibid.}\]
facilitates communication. Two somewhat different research approaches have been reported. The first, initiated by Runkel, utilized Coombs' unfolding technique as the index of cognitive similarity. He found that students who were cognitively similar to their instructor received better grades in the basic psychology course than did students who were not cognitively similar to the instructor. However, none of the subsequent research employing this method has successfully replicated this study.

This first research approach rests on the assumption that one can identify a subject's cognitive dimensions without requiring the subject to verbalize the dimension. The second approach relies on some kind of a verbally formulated dimension. Either a modified version of Kelly's Role Construct Repertory Test or the semantic differential have been used by the second group of researchers as indices of cognitive similarity. In the most frequently cited of these studies, Triandis found that the greater the cognitive similarity as measured by the Role Construct Repertory Test the


greater the communication effectiveness.\textsuperscript{34} Other research employing similar methods have also successfully supported this conclusion. This research will be examined in the next chapter.

The studies which employed the unfolding technique as the index of cognitive similarity were essentially field experiments. These studies mostly failed to support the hypothesis that cognitive similarity facilitates communication. The second group of studies, however, generally supported the hypothesis. These studies were controlled laboratory experiments which employed artificial messages (semantic differential scales).

Since the experimental environments were not clearly comparable, one is unable to reach a conclusion about the relative adequacy of these measures of cognitive similarity. More importantly, one is unable to reach much of a conclusion concerning the role of cognitive similarity in communication. Since these results have been so inconsistent, it is difficult to reach more than a tentative conclusion about the effect of cognitive similarity upon communication success.

Statement of the problem

This study is an attempt to provide a more adequate test of the general hypothesis that cognitive similarity facilitates communication. For the first time the unfolding technique and the semantic differential methods of assessing cognitive similarity will be employed in the same study. This will permit some assessment of the relative adequacy of these two methods as indices of cognitive similarity. In addition, an effort will be made to improve the validity of the unfolding technique as an index of cognitive similarity. Both the identification of the most appropriate measures and the refinement of existing instruments is necessary if useful research is to be made possible.

A close examination of the previous research has raised a number of questions which led to the framing of fifteen hypotheses to be tested in the present study. (This analysis of previous research will be presented in Chapter II, and the hypotheses will be presented in Chapter III.) Basically, six questions are of interest in this study. (1) Does cognitive compatibility as identified by the unfolding technique facilitate communication? (2) Does cognitive compatibility as identified by the semantic differential facilitate communication? (3) Is there any relationship
between cognitive compatibility as identified by the unfolding technique and as identified by the semantic differential? (4) Do cognitively compatible subjects perceive the message to be more understandable than non-compatible subjects? (5) Does the unfolding technique appear to be a valid measure of cognitive compatibility? (6) Are there important sex differences in ability to create and to interpret messages?

**Significance of the problem**

Runkel and others who employed the unfolding technique as the index of cognitive similarity were primarily concerned with its educational implications. It was thought that cognitive similarity was a potentially significant predictor of educational achievement. That is, those students whose cognitive dimensions relevant to the course were similar to those of the instructor would be expected to receive better grades in the course than those students with dissimilar cognitive dimensions.

The significance of this problem is not limited to classroom communication, however. It appears to be central to a theory of communication. I have argued earlier in this chapter that there must be similarities of meaning between individuals if they are to communicate successfully. It has been suggested that cognitive
similarity can produce similarity of meaning. Therefore, it is essential that we determine whether cognitive similarity facilitates communication. If this hypothesis is supported, we will be better able to predict both communication effectiveness and failure. Finally, if this hypothesis is supported, we must determine how cognitive similarity can be most accurately identified.
CHAPTER II
ANALYSIS OF THE INDEPENDENT VARIABLE

Cognitive similarity is the independent variable of interest in the present research. In Chapter I it was argued that similarity of cognitive processes enables two individuals to anticipate similar experiences. Anticipation of similar experiences is a basis for similar meanings which, in turn, lead to effective communication. Therefore, it is hypothesized that cognitive similarity facilitates communication.

This independent variable has been variously referred to in the previous literature as cognitive collinearity, cognitive compatibility, and cognitive similarity. Both collinearity and compatibility refer to the cognitive commonality identified by the unfolding technique. Those researchers who have used either the Role Construct Repertory Test or the semantic differential have consistently used the term "cognitive similarity." Since the interchangeable use of these terms can become confusing, a consistent usage will be adopted here. I prefer to use cognitive compatibility regardless of what measurement method has been used.

22
However, to avoid confusion in the structure of this analysis of research, cognitive collinearity will be used in this chapter only to refer to the cognitive commonality identified by the unfolding technique. Cognitive similarity will be used in this chapter only to refer to the cognitive commonality identified by either the Role Construct Repertory Test or the semantic differential.

As indicated in the first chapter, two independent lines of cognitive compatibility research have developed. This research differs primarily in the assumptions involved in the measurement of cognitive compatibility. These two lines of research will be examined in turn.

The concept of cognitive collinearity

According to Runkel, the number of attributes of a stimulus to which an individual can potentially respond defines a multidimensional space. The individual will often simplify the interrelationships of potential responses within this multidimensional space by arranging relevant attributes in some way into a linear (unidimensional) order. As a result, the orientation toward a set of stimuli has become highly structured because the individual responds to these stimuli as if they were simply ordered rather than existing in
a multidimensional space. The individual has, in effect, resolved a multidimensional space into a unidimensional one.¹

Underlying each ordering of stimuli is an attribute or dimension of which the individual may or may not be aware and which may or may not be discoverable by others. One advantage of the unfolding technique of measurement,² used by Runkel as the collinearity index, is that it is not necessary that the experimenter discover the nature of the dimension or even label the dimension. It is enough that this method reveal whether the dimensions used by two individuals are collinear. Related to this is the advantage that the subject is not required to verbally formulate the cognitive dimension which he is using. This is significant to Kelly's claim that many of the constructs (cognitive dimensions) which are used by an individual are never verbally formulated.³

When two individuals employ the same underlying


dimension to order a set of stimuli, it is said that their cognitive orientations are collinear. If the underlying dimension is not the same, their orientations are said to be non-collinear. If two individuals form collinear orientations, communication between them should be more successful.\(^4\)

As an illustration, let us say that a movie critic and the Legion of Decency have been asked to evaluate five movies. The critic, who evaluates in terms of artistic merit, ranks the five movies in the order ABCDE on the basis of plot development. The Legion of Decency ranks the movies CEDBA on the basis of the amount of nudity shown. The critic and the Legion of Decency are non-collinear because they employ different underlying dimensions. According to Runkel, they should have difficulty communicating about movies. Interestingly enough, a voyeur could be collinear with the Legion of Decency even though he ranked the movies in the reverse order (ABDEC). Although they do not agree which movie was "best", each would understand the other's basis for ranking the movies. They could effectively communicate because each would be able to predict the responses of the other. Collinearity does not, therefore, refer to agreement in the ordering of stimuli, but

to agreement on the attribute used as the basis of ranking.

The most complete discussion of the unidimensional unfolding technique used by Runkel to determine cognitive collinearity is found in Coombs' *Theory of Data.* Typically, all possible triads of a limited set of stimuli are presented to the subjects. The subjects are asked to identify both the most and the least preferred stimulus in each triad. The subjects are, in effect, ranking the stimuli in order of preference. The result is an individual preferential order for the set of stimuli. This individual order is called the I scale. If two or more I scales are collinear they will "unfold" into a joint or J scale.

The relationship of the J scale to the I scale can be explained this way. The J scale is a dimension upon which there are points representing each stimulus and some individuals. The point representing the individual is his ideal point. This ideal point corresponds to the stimulus which the individual prefers to all possible stimuli in the population of stimuli. If the individual is asked to respond only to five stimuli sampled from this population of stimuli, only these five stimulus points are located along this dimension. It is

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likely that the individual's ideal stimulus is not among these five stimuli. Therefore, the individual's ideal point will fall somewhere between two of the five stimulus points on the J scale. "Each individual's preference ordering of the stimuli from most to least preferred corresponds to the rank order of the absolute distances of the stimulus points from the ideal point, the nearest being the most preferred." In other words, if the J scale were folded at the ideal point, the resulting rank order of stimuli given in order of increasing distance from the ideal point would be the individual's preference ordering of the stimuli, or his I scale. The production of the I scale from the folded J scale is illustrated in Figure 1. If this J scale which has been folded in Figure 1 were unfolded again and then folded at another point, the I scale which results is collinear with the I scale produced in Figure 1. All the I scales which can be generated by folding the J scale are collinear.

This explanation of the production of I scales from the J scale serves to illustrate the relationship of the I scale to the J scale. In research, however, one must produce the J scale from a set of I scales. The necessary procedure is described by Coombs.  

6Ibid., p. 60.  
7Coombs, A Theory of Data, pp. 85-95.
Runkel has prepared a table which can be used to determine if I scales of five stimuli unfold onto the same J scale.8

Figure 1—I scale formed from a folded J scale

In summary, certain assumptions about Runkel's conceptualization and measurement of cognitive collinearity should be made clear. First, Runkel assumed that a multidimensional cognitive domain is typically simplified into a unidimensional one. This suggests

8This table is reproduced in Runkel, "Cognitive Similarity in Facilitating Communication," p. 182; and Combs, A Theory of Data, p. 124.
that there is a single salient dimension which, in a
sense, cuts through a specified cognitive domain. This
dimension determines one's responses both to stimuli
within the domain and to messages about these stimuli.

This assumption presents some conceptual diffi-
culties because a number of studies of personality,
social perception, meaning, attitudes, etc., which have
employed such methods as the semantic differential, the
Role Construct Repertory Test, factor analysis, and
multidimensional scaling suggest that people can respond
along two or more dimensions. However, even though
subjects can generate more than one dimension, one can-
not be certain that they frequently employ more than
one dimension in their responses.

De Soto and associates emphatically concluded
that the single linear dimension characterizes cog-
nitive processes. In a summary article, De Soto and
Albrecht offered four general cognitive principles:

1. People have a predilection for linear
orderings. . . .

2. People have a predilection for single
orderings. . . . as opposed to a multiple
discrepant ordering of the set, which people
find un congenial or aversive. . . .

3. People end-anchor orderings. . . .

4. An end-anchored, single, linear ordering
is a conceptual good figure in the sense of the
Gestalt psychologists. By this we mean that
it is an organization toward which thought
tends as conditions permit and foster it, not
in any sense an inevitable conceptual organization.\(^9\)

De Soto explained this predilection for the single ordering in more detail in an earlier article.

People are good at thinking of elements as ordered because they can readily arrange them appropriately on an axis—ordinarily the vertical axis—in their cognitive space. But this space is in a sense one-dimensional. It does not provide other axes; even the left-right axis seems relatively unavailable. And the space is certainly not an n-dimensional cartesian coordinate system in which an element can have different values on different dimensions, nor can an element simultaneously occupy different positions on the one axis. Thus if a subject is asked to think of people as ordered by wealth, he can do so readily enough, arranging them on the vertical axis. But he cannot simultaneously arrange them on another axis called "power" or one called "prestige". There is no other axis, no additional way of imposing an ordering on the set of elements.\(^10\)

This viewpoint, if accepted, appears to support Runkel's assumption that the cognitive domain is unidimensional.

Turning to the second assumption, one must consider the case in which two individuals generate preference orders of stimuli which the unfolding

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technique of scaling reveals to be collinear orders. It is assumed that the cognitive dimensions used to generate these preference orders are also collinear. Related to this is a third assumption. It is assumed that cognitive dimensions need not be highly similar to be collinear. According to Runkel, a total of 70 ways of ordering five stimuli can be generated by a pair of compatible cognitive dimensions.  

Cognitive collinearity research

Runkel appears to have reported the earliest study of the role of cognitive collinearity in communication. In this study, five statements related to the content of an introductory psychology course were used as stimuli in the unfolding technique. He found that students who were cognitively collinear with their instructor received better grades in the basic psychology course than did students who were not collinear with the instructor. Since the results could not be explained as a difference in academic aptitudes, he concluded that students and instructors whose cognitive spaces were collinear were able to communicate more effectively about the course material.  

12 Runkel, "Cognitive Similarity, pp. 178-191."
Youssef, who reported the second study, introduced an important design modification. Unlike Runkel, Youssef attempted to identify the frame of reference relevant to the stimulus statements used in the unfolding technique. He attempted to do this by asking education graduate students who had passed the doctoral examination in a previous year to list (1) what they thought the objectives of the doctoral program to be, (2) the educational outcomes which they thought the examiners had intended to measure in the written examination, and (3) the criteria which they believe the examiners had actually used in grading the examinations. Five statements were extracted from each of these frames of reference for use in the three unfolding scales. Graduate students who had recently completed the qualifying examinations and their examiners completed these three scales.13

Youssef failed to find support for any of his five hypotheses. The graduate students who were collinear with their examiner within any of the frames of reference did not score higher on the qualifying examination. Even those students who ranked the stimuli in

the same order as their instructor (correlational similarity) did not enjoy a significant advantage.\textsuperscript{14}

A replication of the earlier Runkel study also failed to support the hypothesis that cognitive collinearity facilitates communication. Unlike Runkel, Menges found that achievement in a psychology course did not seem to be related to cognitive collinearity.\textsuperscript{15}

One interesting finding did emerge from this study. The non-collinear students appeared to expect more from the course and the instructor than had the collinear students. At the end of the semester the non-collinear students did not evaluate the course and the instructor as highly as the collinear students had.\textsuperscript{16} Apparently their high expectations for the course had not been realized. Even though cognitive collinearity did not affect course achievement, it appears to have affected course and instructor evaluation. It might be that the evaluations of the non-collinear students had become more negative because they were having trouble understanding the professor.

\textsuperscript{14}Ibid., pp. 57-67.


\textsuperscript{16}Ibid., pp. 453-456.
This explanation becomes even more plausible when one notes that non-collinear students report having initiated more communication with the professor than collinear students.\textsuperscript{17} Their more frequent interaction with the professor might have been an effort to understand material which they found difficult to understand.

Menges appears to have overlooked a plausible explanation for his failure to replicate Runkel's results. Runkel's subjects were undergraduates in the basic psychology course. Menges' subjects were M.A. students in an educational psychology survey course. The graduate students were probably already familiar with much of the content of the course. This is less likely to be true in the basic psychology course. On the whole, the graduate students were probably better and more motivated students. In view of the difference in sample and the fact that most test questions were drawn from the text material, it is possible that cognitive collinearity effects did not have the opportunity to emerge in the Menges study. That is, it is possible that differences in initial knowledge and in motivation to learn would have made Menges' subjects less dependent

upon the instructor's lectures to acquire an understanding of course content.

Finally, Lin et al. reported that in each of their four studies they failed to find support for the hypothesis that cognitive collinearity facilitates communication. They reported a loss of faith in Runkel's method, but not in the theory itself.18

The methodology of these four studies deserves some comment. In the first of these, ten stimulus statements representative of psychological knowledge and viewpoints were used. These statements were not presented to the subjects in all possible triads as in previous research. Instead, the subjects simply rank-ordered the ten statements. A factor analysis and a nonmetric factor analysis of these rank-orders were performed to identify groups of statements which could be used as scales to represent the domain of the ten statements. This analysis generated nine subsets of statements which were used as I scales in the unfolding technique.19

The remaining three studies utilized the five stimulus statements used by Runkel in the original study.

18 Yi-Guang Lin, Wilbert J. McKeachie, Marilyn Wernander and James Hedegard, "The Relationship Between Student-Teacher Compatibility of Cognitive Structure and Student Performance," Psychological Record, XX (1970),

19 Ibid., p. 514.
In one study a second set of five statements was also used. Cognitive collinearity computed from either set of five statements was not found to be related to grades in the course. In another study the subjects were asked to respond twice to Runkel's stimulus statements. During one testing period they ranked the statements according to their personal preferences for the statements. During the other period they ranked the statements the way in which they thought the instructor would rank them. Again, collinearity computed from either rank order was not related to grades in the course.

One is compelled to conclude that the bulk of the research in which Coombs' unfolding technique was used as the index of cognitive collinearity failed to support the general hypothesis that cognitive collinearity facilitates communication. Only Runkel's original study supported this hypothesis. It will, however, be argued later in this chapter that there are some problems in the design of much of this research. It may be as Lin et al. have suggested that the method is at fault rather than the theory. Possibly some design modifications will produce different results.

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20. Ibid., pp. 516-517.
21. Ibid., pp. 519-520.
Cognitive similarity

The unfolding technique used in the research cited above is thought to identify cognitive dimensions without requiring the subject to verbally identify or label the dimension. Indeed, the subject might not even be aware of the dimension he is utilizing.

A second research approach appears to rest on the assumption that individuals can verbally identify their cognitive dimensions. The Role Construct Repertory Test and the semantic differential have been used in this research as indices of cognitive similarity. These methods permit the identification of several dimensions so it obviously is not assumed that one's cognitive space is unidimensional. Operationally, cognitive similarity is defined either as the number of similar pairs of polar adjectives elicited from a pair of subjects or as the distance expressed as D scores between the semantic differential profiles of a pair of subjects. Unlike the studies which used the unfolding technique, cognitive similarity can be expressed here in terms of degrees rather than as a dichotomy.

In the first of his three studies, Triandis hypothesized that if two people categorize events, objects, or people in similar ways, communication
between them should be more effective. Measures of two types of cognitive similarity were obtained.

The first, categoric similarity, is obtained by comparing the categorizations of two Ss through an adaptation of Kelly's Role Repertory Test. The second, syndetic similarity, is obtained by comparing the ways concepts are associated with other concepts and uses Osgood's semantic differential.

The subjects were industrial supervisors and their subordinates. Communication effectiveness was assessed only by asking the subjects how effective they perceived supervisor-subordinate communication to be. Both measures of cognitive similarity were found to be related to perceived communication effectiveness.

In the second study the subjects completed a Role Construct Repertory Test of 12 triads of pictures of emotional expression. Two judges determined whether the dimensions used by pairs of subjects were identical, synonymous, dissimilar, etc. Triandis referred to this as attribute similarity.

The pairs of subjects were separated by a

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23Ibid.

24Ibid., p. 326.

partition and then instructed to communicate via written messages in an effort to determine which one of two of these pictures of emotional expression was held in common. The messages were polar adjectives on a seven-point semantic differential scale. The subject completed the message by placing an "X" on one of the scale positions. In the free list condition, the subjects were permitted to use any adjectives. In the same list condition, the adjectives were selected from a list provided by the experimenter. In the different list condition, each of the two subjects selected adjectives from a different list. The polar adjectives selected for these messages were judged for similarity by two judges. Triandis used this as a measure of communication similarity.

Attribute and communication similarity were found not to be correlated which suggests that they are different in nature. Both attribute and communication similarity were found to be related to communication effectiveness. The greater the similarity, the greater the communication effectiveness. However, it appears that people can communicate even when forced to use completely different dimensions as in the different list.

\[26\text{Ibid.}, \text{pp. 177-178.}
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\[27\text{Ibid.}\]
condition. Communication did not completely break down
in this condition.\textsuperscript{28} Although there were significantly
fewer accurate identifications, the number of accurate
identifications was still above the chance level.

In the final study, Triandis began with the
assumption that A and B must use the same cognitive
dimensions to effectively communicate. The purpose of
this research was to determine if "they must also agree
with one another when assigning events to positions
along these dimensions.\textsuperscript{29}

The subjects were asked to complete a \(1\frac{1}{4}\)-scale
semantic differential for each of ten value concepts.
Later each subject was presented with the semantic differen-
tial profiles of four other subjects. In each case
they were asked to identify which of three concepts the
other person had described in his semantic differential
profile. Triandis found that agreement on assigning
events on a dimension can deviate by about one-fourth
of the seven point continuum before communication is
seriously affected. These results suggest that while
similarity of semantic differential profiles is related

\textsuperscript{28}Ibid., pp. 179-180.

\textsuperscript{29}Harry C. Triandis, "Some Determinants of
Interpersonal Communication," \textit{Human Relations}, XIII
(1960), 279.
to communication effectiveness this similarity need not be close.\textsuperscript{30}

Shibuya used a similar procedure in his studies of cognitive similarity conducted in a Japanese university. Thirteen semantic differential scales were used as the measure of cognitive similarity in both studies reported by Shibuya. The subjects were asked to use these scales to rate their impressions of twelve photographed individuals. In the first study ten pairs of subjects who had similar semantic differential profiles and ten who had dissimilar profiles were selected for the experiment. In the second study twelve subjects with similar profiles and twelve with dissimilar profiles were used.\textsuperscript{31}

As in the Triandis research, pairs of subjects were separated by partitions and were instructed to identify which of two photographs was held in common. In the first study the subjects communicated by completing semantic differential scales prepared by the experimenter. In the second study subjects had more freedom because they could choose any number of scales.

\textsuperscript{30} Ibid., p. 285.

from a set of 13 to use as their messages. Shibuya's hypotheses were supported in the second, but not in the first study.\textsuperscript{32}

**Critique of the research**

It might appear from this examination of the research that cognitive compatibility as measured by either the Role Construct Repertory Test or the semantic differential does facilitate communication. On the other hand, the unfolding technique does not appear to be a satisfactory index of cognitive compatibility. It would appear that the most valid test of cognitive compatibility developed so far is either the semantic differential or the Role Construct Repertory Test.

However, such a conclusion is difficult to sustain because there are some difficulties with this research which make it doubtful that cognitive compatibility has been shown to facilitate communication. It appears that in spite of these studies the basic question remains largely unanswered.

In the first of the three studies reported by Triandis, the only measure of communication effectiveness was the subjects' reports of perceived communication effectiveness. Of course, one's perception of communication effectiveness may be in itself interesting \textsuperscript{32}Ibid.
and significant, but it does not provide evidence that the communication between the supervisor and the subordinate was effective by any external criterion.

The second of Triandis' studies appear to be his most important. In this study, Triandis tested two hypotheses. His "informal" statement of these hypotheses is particularly revealing.

The more similar the language used by persons A and B during the process of communication, the more effective will be their communication. The more similar the language used by A and B when they are judging events similar in content to the events about which they will later communicate, the more effective will be their communication.33

Notice that the statement of the hypotheses suggests that this is more of a study of language similarity than of cognitive similarity. Certainly language is related to cognitive processes, but this relationship is not specified by Triandis.

Apparently Triandis assumed that similar adjectives would be generated by similar cognitive dimensions. Yet, he does not demonstrate the validity of this assumption. It is reasonable to assume that a subject utilizes a cognitive dimension when he decides that two stimuli are similar but different from a third stimulus. When pressed, as in the Role Construct Repertory

Test, he can also label that dimension. In many cases this label is probably not completely satisfactory to him, but at least it has meaning for him. The experimenter, however, cannot know what that labeled dimension "means" to the subject. Therefore, he cannot with much confidence, as in Triandis' study, decide that similar labels used by two different subjects refer to the same dimensions. For example, Triandis reported that one subject labeled an elicited dimension as "good date-poor date". Even if another subject used this same label, there is no way of knowing that this second dimension is not orthogonal to the first. One knows from experience that different males perceive females differently along a "good date-poor date" dimension. Furthermore, Triandis admitted that his judges stretched the meaning of synonymous dimensions to include such seemingly different labels as "natural" and "motherly" and "unkind" and "remote". Therefore, it appears that we have no real way of knowing whether dimensions judged to be similar on the basis of their labels were so in fact.

Runkel's study presents other interpretation problems. Runkel selected the introductory psychology course as the relevant cognitive domain for his study.

\[\text{\textsuperscript{34}}\] \textit{Ibid.}, p. 179.
Unfortunately, a survey course such as this is not a unitary domain. There is probably little likelihood that a single dimension could be found which would cut completely across or underlie this domain. This would probably be even more true of students who know little about psychology.

Runkel arbitrarily selected five statements which appeared to him to represent different viewpoints about psychology. These were statements "which could be seen as related to the content of the course but which were not assertions of the kind that would be made as a part of the material to be learned in the course or given as items on tests". These statements were used as stimuli in the unfolding technique of measurement. He cites no evidence to indicate that another set of five statements extracted from this domain would not unfold into a different dimension. It seems reasonable to expect that any set of stimuli extracted from a domain should consistently unfold into the same dimension. It is very possible that had Runkel used two unfolding scales with different sets of statements supposedly extracted from the same domain that students compatible with the instructor on one scale would be found to be non-compatible on the second scale. Such a finding would have

rendered his results virtually uninterpretable because one would not be able to decide whether the student was actually compatible or non-compatible with the instructor. The research by Menges and by Lin et al. share the same problem.

Youssef's attempt to identify and define the cognitive domains and to extract statements judged to be relevant to the domains seems to be a significant methodological improvement. Unfortunately, he had subjects complete the scales long after the student-examiner communication had been completed. He apparently assumed that these dimensions remained unchanged during this length of time. I know of no relevant evidence concerning the stability of cognitive dimensions as measured by the unfolding technique. One would expect however, that those doctoral students who failed the qualifying examination would have altered their cognitive dimensions concerning the examination as a result of the experience. Since one cannot be sure that the actual cognitive compatibility between student and examiner at the time of communication has been identified, one must again conclude that this was not a satisfactory test of the hypothesis.

Although serious questions have been raised concerning the use of the unfolding technique as an
index of cognitive compatibility, Runkel's approach still remains, in Zajonc's words, "a provocative social-psychological application of the dimensional approach to cognition. . . ." Therefore, instead of abandoning the unfolding technique as an index of cognitive compatibility, an effort will be made in the present study to improve its use. These improvements will be described in Chapter III.

The use of the semantic differential also raises some questions even though its results have usually predicted communication accuracy. The apparent adequacy of this method has been demonstrated only in controlled laboratory experiments which employed semantic differential scales as messages. Since these messages would likely be perceived by the subjects as unusual or artificial, it is possible that they responded to these messages differently than they would have responded to prose messages. The unfolding technique has been employed only in field experiments in which there was less control, but the communication was realistic instructor-student interaction. These experimental environments are not clearly comparable.

In an effort to assess the relative adequacy of these two measures, the unfolding technique and the semantic differential will be used as measures of cognitive compatibility within the same research design. Such a comparison is significant because it could help to determine whether the conflicting results of previous research are due to differences in efficacy of the indices of cognitive compatibility or whether they are due to differences in message forms and communication contexts.

All of these questions are significant to the study of cognitive compatibility. The primary question raised in this study, however, is whether cognitive compatibility facilitates communication.
CHAPTER III
HYPOTHESES AND METHODOLOGY

Hypotheses

As previously indicated, the main objective of this study is to test the general hypothesis that cognitive compatibility facilitates communication. Two methods of identifying cognitive compatibility—the unfolding technique and the semantic differential—will be used with the same subjects in the same design. Hypotheses pertaining to cognitive compatibility identified by the unfolding technique will be presented first.¹

Hypothesis 1: Among subjects who yield consistent preference orders of stimuli, those who are cognitively compatible with the communicator as determined by the unfolding technique will correctly identify the message referent significantly more often than those who are not cognitively compatible with the communicator.

One difficulty that has been encountered with the use of the unfolding technique is that a large

¹All hypotheses, of course, will be tested in the null form even though they are not presented here as null hypotheses.
proportion of the subjects produce highly inconsistent preferential ordering of stimuli. Previous researchers have all discarded the data of such subjects. This has meant the loss of from 14% to 48% of the subjects in the reported previous research.\(^2\) Although it is not yet known why some subjects produce inconsistent preference orders, one cannot justifiably ignore such a large proportion of any sample of subjects. Inclusion of subjects with inconsistent preference orders might better specify the relationship of cognitive compatibility to communication success. Since little is known about this group, predictions are somewhat difficult to make.

Hypothesis 2: Subjects who produce inconsistent preference orders of stimuli will correctly identify the message referent significantly less often than those subjects who are cognitively compatible with the communicator.

Hypothesis 3: Subjects who produce inconsistent preference orders of stimuli will correctly

\(^2\)Percentages computed from data reported by the various researchers. The smallest proportion of inconsistent preference orders was reported by Yi-Guang Lin, Wilbert J. McKeachie, Marilyn Wernander, and James Hedegard, "The Relationship Between Student-Teacher Compatibility of Cognitive Structure and Student Performance," *Psychological Record*, XX (1970), 513-522. The largest proportion was reported by Philip J. Runkel, "Cognitive Similarity in Facilitating Communication," *Sociometry*, XIX (1956), 178-191.
identify the message referent significantly less often than those who are not cognitively compatible with the communicator.

The fourth hypothesis pertains to cognitive compatibility identified by the semantic differential.

Hypothesis 4: Subjects who produce semantic differential profiles which are similar to those of the communicator will correctly identify the message referent significantly more often than those who produce dissimilar profiles.

In the previous chapter it was noted that both Kelly and Runkel had assumed that a cognitive dimension can be said to exist even though the individual is unable to verbalize it. One advantage that can be claimed for the unfolding technique is that it permits the investigator to discover the existence of a cognitive dimension even though neither the investigator nor the subject can label or describe the dimension. The semantic differential, on the other hand, requires more awareness of both the dimension itself and the location of the stimulus along that dimension. In addition, there is no assumption made with the use of the semantic differential that subjects are responding only along a single dimension. Responses to the unfolding technique are assumed to be unidimensional. Since different assumptions
are involved in these measurement methods, it is not clear to what extent these measures identify the same cognitive dimension. Since a secondary objective of this study is to assess the relative adequacy of the semantic differential and the unfolding technique as indices of cognitive compatibility, it is of interest to determine whether there is any correlation between the results of the unfolding technique and of the semantic differential. This question is expressed in the next three hypotheses.

Hypothesis 5: Communicator-receiver dyads who are cognitively compatible as determined by the unfolding technique will produce more similar semantic differential profiles than communicator-receiver dyads who are not cognitively compatible.

Hypothesis 6: Communicator-receiver dyads who are cognitively compatible as determined by the unfolding technique will produce more similar semantic differential profiles than communicator-receiver dyads in which the receiver produced inconsistent preference orders.

Hypothesis 7: Communicator-receiver dyads who are not cognitively compatible as determined by the unfolding technique will produce more similar semantic differential profiles than communicator-receiver dyads
in which the receiver produced inconsistent preference orders.

A second way of determining whether cognitive compatibility facilitates communication is to ask the subject to rate how successful he perceives the communication to have been. Research reviewed in the previous chapter suggested that subjects with cognitive dimensions which were not compatible with those of the communicator had some awareness that the communication was not entirely satisfactory. It appeared that these subjects perceived the communicator to be difficult to understand even though test scores did not always reveal that these subjects had difficulty understanding the communicator. Two questions are suggested here:

(1) Do those subjects with cognitive dimensions which are not compatible with those of the communicator perceive the communicator to be difficult to understand?

These questions are reflected in the next five hypotheses. It will, of course, be necessary to compute correlation coefficients between expressed confidence and both cognitive compatibility identified by the unfolding technique and cognitive compatibility identified by the semantic differential.

Hypothesis 8: Subjects who are cognitively compatible with the communicator as determined by the
unfolding technique will indicate that they are more confident that they have correctly identified the message referent than will subjects who are not cognitively compatible.

Hypothesis 9: Subjects who are cognitively compatible with the communicator as determined by the unfolding technique will indicate that they are more confident that they have correctly identified the message referent than will subjects who produce inconsistent preference orders.

Hypothesis 10: Subjects who are not cognitively compatible with the communicator as determined by the unfolding technique will indicate that they are more confident that they have correctly identified the message referent than will subjects who produce inconsistent preference orders.

Hypothesis 11: Subjects who produce semantic differential profiles which are similar to those of the communicator will indicate that they are more confident that they have correctly identified the message referent than will those subjects who produce dissimilar profiles.

Hypothesis 12: Subjects who correctly identified the message referent will report more confidence in their answer than will those who failed to correctly identify the message referent.
Because of the nature of the communication task used in this study, there is reason to expect that the sex of both the communicators and the subjects would affect the results. The communication task will be described in detail later in this chapter, but a brief description is required here in order to understand the potential sex effects. The communicators were instructed to describe a stimulus person's perceived personality after examining his photograph. The subjects read these personality sketches and attempted to identify which of three pictured individuals had been the subject of the personality sketch.

There is some evidence that men and women cite different characteristics when asked to describe a stimulus person. Several reviews of the research conclude that men are more likely to describe the physical appearance of the stimulus person while women are more likely to mention inferential, psychological characteristics.3 Research also suggests that women have a greater tendency toward stereotyping than men, seem

to be less analytical and more intuitive. . . ." \(^4\)

In the present study the communicators were instructed to discuss only personality (psychological) characteristics of the stimulus person. Social perception research suggests that the female communicators might find this to be an easier task than the male communicators because they more readily respond in psychological terms. If this is true, it is possible that the females would create a more effective description of the personality of the stimulus person. The messages created by females might be easier to interpret.

There is no direct evidence that female subjects are more successful at matching a personality description with the described stimulus person. However, since females appear more likely to describe in terms of psychological characteristics, it is also likely that psychological traits used in a description would be more meaningful to female subjects. They might be more successful at matching psychological traits with the appropriate stimulus person.

Therefore, it was expected that women (1) will be more effective communicators and (2) will receive higher communication accuracy scores. These expectations

are reflected in the next two hypotheses.

Hypothesis 13: Subjects will identify the referent of messages created by female communicators more frequently than the referent of messages created by male communicators.

Hypothesis 14: Female subjects will identify the message referent more frequently than male subjects.

Finally, some effort should be made to assess the validity of the unidimensional unfolding technique as a measure of cognitive compatibility. Previous researchers have assumed that the preferential ordering of five stimuli drawn from a cognitive domain reveals the single primary dimension relevant to that domain. If this assumption is sound, one should be able to draw any number of sets of five stimuli from this domain and find that all preference orders "unfold" into the same dimension. If it is found that two individuals are cognitively compatible when some of the sets of stimuli are used, but not compatible when other sets are used, the method is rendered virtually useless. If this occurred, one would not know whether the two individuals were, in fact, cognitively compatible. Thus, this method would not appear to have much value as a predictive measure of communication success.

Three sets of stimuli were used in this study. It is expected that if two individuals are compatible on
one of the three sets used, they should also be compatible on the other two.

Hypothesis 15: For each subject, the cognitive classification (i.e., compatible or non-compatible) will be the same for all three sets of stimuli used with the unfolding technique.

Measurement of the independent variable

The unfolding technique and the semantic differential scale were employed as separate measures of the independent variable—cognitive compatibility.

The unfolding technique. —The unfolding technique has been described in Chapter II. The use of this scaling method differed from previous research only in the choice of stimuli and the number of scales used.

Some questions were raised in Chapter II about the stimuli that have been used with the unfolding technique. It was argued that responses to five statements relevant to psychology are unlikely to reveal a single cognitive dimension which mediates one's responses to lectures in an introductory psychology course.

Since this method assumes the existence of a single dimension which, in a sense, cuts through or underlies a cognitive domain, its use seems to be
limited, at present, to unidimensional domains. It is argued here that one's impressions of other people based on very limited information are likely to be unidimensional. In a situation in which the stimulus person has little cue value, one is likely to assess the personality of this person along some personally salient dimension. Secord and Backman concluded that one of the fundamental generalizations about person perception is that "each perceiver has certain central traits or characteristics that he emphasizes in describing others. The other person is always sized up with respect to the degree to which he possesses or lacks those traits."  

This conclusion suggests two points. First, individuals typically employ personally salient dimensions such as intelligence, mood, or honesty in their assessment of other people. Second, this central trait is a "true" dimension because the perceived person is assigned some value or is located along the dimension. A conclusion is reached concerning the degree to which he possesses the trait. In a more recent review, Tagiuri observed that "there is considerable evidence . . . that individuals differ consistently in the traits they use . . .

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in their perceptions and thoughts about others."  

Finally, research reported by Secord suggests that people can readily make inferences about the personality of others even from photographs which would seem to have little cue value. He also found some consistency among these personality descriptions which suggests the existence of facial stereotypes. This evidence suggests that people frequently and consistently employ personally salient dimensions in their responses to others. Furthermore, it appears that people readily make inferences about personality from photographs in spite of their limited cue value.

For these reasons, it is argued that responses to photographs of people not known to the subjects would more likely be unidimensional than were the responses to the stimuli used with the unfolding technique in previous research. Ten photographs of males and five of females were arbitrarily selected from among photographs of graduating seniors published in a university yearbook. Since this university was some

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distance away, it is unlikely that any of the subjects knew any of the stimulus individuals. No clearly defined criteria were used in the selection of the stimulus photographs. An effort was simply made to avoid a sample of individuals who were similar in appearance. An earlier sample of pictures in which the individuals had been similar in appearance had been pre-tested with a group of students who were not used as subjects in this study. These students produced a high proportion of inconsistent preferences. Apparently similar-appearing stimulus individuals were difficult to rank in preferential order. Therefore, an effort was made to avoid a sample of individuals who were similar in appearance. These individuals appeared to be similar in age and dress, but were dissimilar in other relevant respects. An inspection of the pictures in Appendix A reveals that there was a variety of hair lengths, hair styles, beards, moustaches, and eye glasses.

These pictures were separated into three sets of five each. Since it is possible that individuals employ different dimensions when responding to pictures of females than when responding to pictures of males, the five pictures of females were separated from those of males to form a separate scale. The other two scales each consisted of pictures of five different males. For
each of the three scales, all ten possible triads of pictures were formed. The resulting 30 triads were glued to three sheets of white paper in such a way that no two triads from the same scale followed each other. This was done to make any inconsistencies in preference orders less obvious to the subjects. Although this probably produced more reliable preference orders, it also probably produced more inconsistent results.

Yet, even with this system which encouraged inconsistent preference orders, only 20% of preference orders were inconsistent. This is among the lowest proportion of inconsistent results reported for the unfolding technique. This suggests that the stimuli used did, in fact, elicit clear cognitive dimensions.

Subjects were instructed to imagine that they were to select a group of people to work with on some important project not related to course work. They were to examine each triad, make inferences about the personality of each pictured person and then decide with whom they would most prefer to work and with whom they would least prefer to work. Each picture had a letter printed below it. The subjects were to record their answers on an answer sheet by circling the letter corresponding to the most preferred individual and placing an "X"
through the letter corresponding to the least preferred individual. The unfolding technique of scaling was used to determine cognitive compatibility.

The semantic differential.—The semantic differential scale was used as the second measure of cognitive compatibility. It was used in this study in much the same way that it had been used by Shibuya. The polar adjectives used for the scales were elicited from Speech 110 (group discussion) students. These students were shown a triad of pictures taken from each of the unfolding scales described above. For each triad they were to decide which two individuals had personalities which were similar in some important way, but different from the third individual. They then identified both the pair and the attribute on which they were similar. Then they were asked to identify what they considered to be the opposite of that attribute. They were then asked to repeat this procedure at least two more times using either the same pair or a different pair of individuals. This is, of course, essentially the Role Construct Repertory Test which has been previously described.

Each student generated at least nine sets of

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polar adjectives; some, of course, were duplicates. The twelve polar adjectives chosen for this measure of cognitive compatibility were selected from among the most frequently used sets of polar adjectives. An attempt was made to select twelve independent sets of polar adjectives. This attempt was not completely successful. There is, for example, probably some relationship between such dimensions as "tactful-tactless" and "sensitive-insensitive".

The following sets of polar adjectives were selected for use in the measure of cognitive compatibility: exciting-dull, ambitious-lazy, broad-minded-narrow-minded, tactful-tactless, determined-aimless, conceited-humble, confident-diffident, sociable-unsociable, sensitive-insensitive, intelligent-unintelligent, warm-cold, and imaginative-unimaginative.

These polar adjectives were used to form 12 seven-point semantic differential scales. One picture was selected from each of the three unfolding scales. A single picture was glued near the top of a sheet of paper on which the 12 semantic differential scales had been reproduced. The test booklet consisted of three of these pages. Each of the three pages had a different picture glued near the top. There was a different order of scales on each page. (These semantic differential scales are reproduced in Appendix B.)
The subjects were instructed to make judgments of each of the photographed individuals' personalities by responding to the twelve semantic differential scales.

**Message forms**

Two male and two female communicators each produced three prose messages and then semantic differential scale versions of each of these prose messages. The four communicators were each given a different triad of pictures selected from each of the three unfolding scales. In no case did any of the pictures used in the semantic differential measure of cognitive compatibility appear in these sets of three pictures. One photographed individual in each of the triads of pictures was designated as the subject of the message. The communicators were instructed to describe the inferred personality of the individual in such a way that others would be able to determine which of the three pictures was the referent of the message. Communicators were permitted to compare and contrast the inferred personality of the subject to that of the other two photographed individuals in the triad. Communicators were permitted only to discuss inferred personality traits in their messages. They could not refer to physical features such as length of hair,
presence of a smile, presence of eye glasses, etc. However, it must be conceded that such personality traits as "pleasantness" suggest the presence of a smile. If only one of the three individuals was smiling, the use of such a personality trait in the message was more likely to "give away" the referent of the message.

These prose messages could be of any length that the communicator felt to be adequate. The resulting messages were from 43 to 196 words in length. No effort was made to improve the style, organization, or grammar of these messages. These messages were doubtlessly uneven in effectiveness.

After the communicator completed each prose message, he then described the inferred personality of the same individual by creating a series of semantic differential scales. The communicator was given several sheets of paper on which there were printed a series of blank seven-point semantic differential scales. The communicator created the message by writing his own bipolar adjectives at the ends of the scale and by placing an "X" on one of the seven positions along the scale. The communicator could produce as many semantic differential scales as he thought were necessary.

Both message forms were then typed and reproduced. Each message was reproduced on a separate sheet
of paper. The triad of pictures labeled "A" "B" "C" was attached to the top of the page. The message was printed below the pictures.

Two message booklets were produced. One consisted entirely of prose messages; the other consisted of semantic differential messages. (Samples of these messages are reproduced in Appendices C and E.) Roughly half of the subjects read one version, the other half the other version. Each version of the message booklet consisted of twelve messages. There were four messages, each created by a different communicator, describing stimulus individuals from each of the three unfolding scales. Half of the messages were created by males; the other half by females.

Each of the twelve messages was assigned a number. A table of random numbers was used to determine fifteen different message orders. These fifteen different forms of each of the two message booklets were produced to help eliminate any order or practice effects.

Dependent measure

The dependent measure consisted of the booklet of twelve messages described above and an answer sheet on which the subjects recorded their answers and expressed the degree of confidence which they had in each answer.
The subjects were instructed to read each of the twelve messages and decide which one of the three photographed individuals was the referent of the message. They recorded their answer by circling the appropriate letter on the answer sheet. The number of correct identifications will be known as the communication accuracy score.

Subjects were cautioned that more than one message might be a personality description of the same individual. This was done to prevent subjects from eliminating from consideration a member of a triad just because this stimulus individual had been identified as the referent of a previous message. This helped to insure that subjects considered all three photographed individuals to be possible referents of a particular message. In fact, there was a case in which two communicators had described the same individual.

After the subject recorded an answer, he expressed his degree of confidence in the correctness of his answer by circling the appropriate number on an eleven-point continuum which ranged from 0 to 100 with increments of ten. (See Appendix E) This will be known as the confidence value.

Procedures

All data were collected during a single class
period. The two measures of cognitive compatibility were administered first. In all cases, the unfolding scales were administered before the semantic differential scales. It was thought that completing semantic differential profiles for three stimulus pictures used in the compatibility measure could alter the preferential orders because one stimulus individual in each scale would, in effect, be more familiar than the other four. After the subjects completed the two measures of cognitive compatibility, they were instructed to read each of the twelve messages and respond to the dependent measure. The dependent measure consisted of the subject's identification of the referent of each message and the subject's expression of confidence in his answer.

The subjects were all students in the basic speech course at Ohio State University. Since two sections of this class met every hour except the first and the last, this suggested a way of determining which half of the subjects read which message version. At each hour in which two sections of this class met, one class was arbitrarily assigned the prose message, the other was assigned the semantic differential message version. Only one section met at 8:00 A.M. and one at 3:00 P.M. The former was assigned the semantic
differential message form and the latter the prose message form. Unfortunately, this was a warm Friday so only four students attended the 3:00 P.M. class. As a result of this and other attendance problems, 92 students read the semantic differential version while only 77 read the prose version.

The data were collected by the author and by three other graduate students who had volunteered to help. In most cases the individual collecting the data was introduced by the regular class instructor. In three of the eleven sections the data collector was also the class instructor.

The data collector began by briefly discussing the purpose and possible significance of the study. The purpose of each instrument was briefly discussed as the instrument was administered. It was thought that this discussion of the study and of the instruments would reduce suspicion. For example, care was taken to assure the students that their responses to the unfolding scales would not reveal anything about their personalities. Pre-test experiences revealed that many students suspected that this was a personality test.

The instructions on the cover of each instrument were read aloud before the instrument was administered. All procedural questions were answered.
Subjects were given sufficient time to complete one instrument before another was administered. Data collection was usually completed within 25 minutes.

Communicators

The communicators were selected from among students in two sections of Speech 110 (group discussion). All students in these two sections were administered the first measure of cognitive compatibility (the unfolding scales). The two males and two females who were found to be cognitively compatible with the fewest number of students were asked to create the messages used in this study. Previous research has revealed that a relatively small proportion of subjects are non-compatible with the communicator. An effort was made in this study to select communicators who would be non-compatible with the maximum number of subjects.

The two male communicators were both sophomores. The two females were both freshmen. Since three of the communicators were planning to enter the nursing program, it is possible that their attitudes, values, goals, etc. were not typical of the subjects drawn from the basic speech course. Because of the nature of the communication task, however, it is unlikely that such differences were significant.
Preparation of data for analysis

The design of this study has been indicated during the discussion of the research procedures. Two measures of cognitive compatibility were administered to all subjects. Roughly half of the subjects read the prose messages; the remainder read the semantic differential versions. After reading each message, the subject identified the referent of the message and indicated his degree of confidence in his answer. Basically, the question of interest was whether there was any correlation between cognitive compatibility identified by either of the two methods and accurate identification of the message referent. The design is, therefore, essentially correlational.

The assignment of subjects to the compatible (CO), non-compatible (NC), and inconsistent (IC) groups requires some explanation. Each subject and each of the four communicators produced preference orders for each of the three sets of stimulus pictures. A subject's preference order for the first set of stimuli was compared with each communicator's preference order for the first set of stimuli. The method described by Coombs was used to determine if the subject's and a communicator's preference orders would unfold into the
same joint scale. If these individual preference orders would unfold into a joint scale, the subject and communicator were said to be compatible on that set of stimuli. This procedure was repeated for each of the other two sets of stimuli. Twelve comparisons—three with each of the four communicators—were made for each subject. As a result, each subject was assigned twelve cognitive classifications. It was possible for a subject to be compatible with a communicator on one set of stimuli, but non-compatible on another set of stimuli. Note that this is illustrated in Table 1.

If a subject's preference ordering of the five stimuli was not at least 70% consistent, the subject was classified as inconsistent for that set of stimuli. Consistency of the preference order was determined by the number of pairs of stimuli in which one stimulus was consistently preferred to the other.

A second measure of cognitive compatibility was obtained by having each subject and each of the four communicators respond to three semantic differential scales. A distance or D score was computed between the subject's first semantic differential profile and the

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first semantic differential profile of each of the four communicators. This procedure was repeated for the other two profiles. As a result, there were twelve D scores for each subject. The larger the D score, the less compatible were the subject and communicator.

Recall that each subject responded to twelve messages—three from each of the four communicators. The compatibility of a subject when responding to any one message is determined by two separate procedures—the unfolding technique and the semantic differential. It is possible for the subject to be identified as compatible by one method and non-compatible by the other.

An examination of Table 1 might clarify these and other points. Table 1 presents a typical set of data obtained from a single subject. Note that this subject is cognitively compatible with communicator F1 on unfolding scale A (first set of stimuli), but is not compatible on scale B. The subject gave an inconsistent preference order when responding to scale C. This illustrates that it is possible for a subject to be compatible with a communicator while responding to the communicator's first message, but be non-compatible while responding to the communicator's second message. In fact, this often occurred.
TABLE I
TYPICAL SET OF DATA OBTAINED FROM A SINGLE SUBJECT

<table>
<thead>
<tr>
<th>Message</th>
<th>Cognitive Compatibility</th>
<th>D Score</th>
<th>Correctly Identified</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. F1*</td>
<td>CO</td>
<td>6.325</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>2. Flb</td>
<td>NC</td>
<td>8.832</td>
<td>No</td>
<td>80</td>
</tr>
<tr>
<td>3. Flo</td>
<td>IC</td>
<td>6.325</td>
<td>No</td>
<td>80</td>
</tr>
<tr>
<td>4. F2a</td>
<td>CO</td>
<td>3.742</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>5. F2b</td>
<td>CO</td>
<td>6.708</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>6. F2c</td>
<td>IC</td>
<td>8.062</td>
<td>No</td>
<td>100</td>
</tr>
<tr>
<td>7. M1a</td>
<td>NC</td>
<td>8.062</td>
<td>Yes</td>
<td>70</td>
</tr>
<tr>
<td>8. M1b</td>
<td>NC</td>
<td>7.681</td>
<td>No</td>
<td>80</td>
</tr>
<tr>
<td>9. M1c</td>
<td>IC</td>
<td>5.657</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>10. M2a</td>
<td>CO</td>
<td>6.215</td>
<td>No</td>
<td>90</td>
</tr>
<tr>
<td>11. M2b</td>
<td>NC</td>
<td>9.614</td>
<td>No</td>
<td>90</td>
</tr>
<tr>
<td>12. M2c</td>
<td>IC</td>
<td>5.916</td>
<td>No</td>
<td>90</td>
</tr>
</tbody>
</table>

*F & M identify sex of communicator; 1 & 2 are the identification numbers of the communicators; a, b, c, identify the unfolding scale from which message referent was drawn.

**CO=compatible, NC=non-compatible, IC=inconsistent preference order.

There can also be a different D or distance score associated with each message. Returning to Table 1, note that the first D score is the computed distance between semantic differential profile A of the subject and profile A of communicator Fl. The fifth D score is the distance between profile B of the subject and profile B of communicator F2, etc.

Tables similar to this were prepared for each of the 169 subjects. For each of the fifteen hypotheses, the appropriate data were extracted from these
tables for analysis. The statistics used in the analysis of data are described in Chapter IV.

**Sample**

The subjects were all students in Speech 105, the basic speech course at Ohio State University. A total of 181 subjects responded to this study. The responses of 12 were discarded because they did not provide a complete set of data. Of the remaining subjects, 81 were males and 88 were females.

All data were collected in the classrooms during the hour in which the students had Speech 105 scheduled. Since intact classes were used, the subjects were self-selected. The sample was further self-selected on the day of the experiment because roughly one-third did not attend class. This low attendance could not be attributed to unwillingness to participate in this study because none of the students knew that this study had been scheduled.

**Possible sources of error**

In the interpretation of the results of this study, potential sources of error must be recognized. Possible sources of error include the sample, the measure, and the experimental procedure.

With a self-selected sample, one runs the risk
of having groups of subjects which differ in some systematic, significant way. When this is the case, results might be due to these uncontrolled variables rather than to the experimental treatments. It is possible that there were important differences between these classes in the intelligence, ability, and demographic characteristics of the students.

A second source of error is the measures used in this study. Much of the discussion in Chapter V will focus on the adequacy of the methods presently used to measure cognitive compatibility. A detailed discussion of this problem will be reserved until then. The assumptions on which these methods rest should be examined. One of these assumptions, of course, is tested in hypothesis 15. That is, it has been assumed that the rank-ordering of five stimuli will reveal the existence of the single cognitive dimension which underlies the cognitive domain. If this is a valid assumption, then the rank-orderings of other sets of stimuli from this domain should uncover the same dimension. Hypothesis 15 deals with the question of the reliability of the unfolding technique.

A third source of error can be found in the experimental procedures. One potentially important source of error within this study was experimenter
effects. It is likely that the four individuals who collected the data differed in ability to motivate the subjects to respond carefully to the measures. The data collector who was also the classroom instructor probably was the most successful in motivating the subjects. It is even likely that the same data collector experienced differing degrees of success in motivating the subjects.

The artificiality of the communication task might be another source of error. Although it is possible that people will find that they must interpret brief messages without opportunity for verifying their interpretations through interaction with the message source, people frequently have this opportunity for dialogue. It is possible that the results would be different if interaction had been permitted in this study.

More will be said about possible sources of error in the discussion of results in Chapter V. This identification of potential sources of error is important in the interpretation of results. It also assists one in the design of future research.

The results of this study will be presented in Chapter IV. The statistics used in the analysis of data will also be described in Chapter IV. Chapter V
will consist of the summary of the study, interpretation of its findings, and suggestions for future research.
The format of this chapter is to present each hypothesis in turn. For each hypothesis, the statistics used in the analysis of data and the results will be presented and discussed. Although the hypotheses have not been presented here in the null form, it is understood that in all cases it is the null hypotheses which are being tested. Failure to support the hypothesis as it is presented means that the appropriate null hypothesis could not be rejected. Support for the hypothesis as it is presented means that the null hypothesis was rejected.

For some of the hypotheses, the results can more easily be interpreted if the data are also separated into four subsets for analysis. Thus, results will be presented for the total data as well as for the four subsets of data. These subsets or groups were formed on the basis of the sex of the subject and on the message form read by the subject. Subset M1, for example, consisted of data generated by male subjects who read the prose message form. Subset F2 consisted...
of data generated by female subjects who read the semantic differential message form. The prose message form is designed as message form 1 while the semantic differential message is form 2. For convenience in reporting results, M1, F1, M2, and F2 will sometimes be used to identify the data subsets.

The creation of these four groups was necessary for three reasons. First, it was hypothesized that significant differences in results would be due to sex differences of subjects and of communicators. It was, of course, necessary to identify the data generated by each sex to test these hypotheses. Second, it was expected that the prose and the semantic differential messages would not be of equal difficulty. Subsequent analysis revealed that 49% of the referents of prose messages were correctly identified while only 40% of the referents of semantic differential messages were correctly identified. This difference is significant at the .001 level ($\chi^2=14.162, df=1$). Third, the creation of these four groups will permit one to examine sex by message interaction which will help one to interpret some of the results.

A total of 181 subjects responded to this study. The responses of 12 were discarded because they did not provide a complete set of data. A total
of 81 males and 88 females provided useable data. The resulting four data subsets were of unequal size—M1=40, F1=37, M2=41, and F2=51.

Each of the 169 subjects responded to 12 messages. This means, of course, that there were a total of 2028 message responses. However, the responses of 15 subjects to one of the three unfolding scales proved to be intransitive. Since intransitivity suggests that the subject was unable to respond unidimensionally while inconsistent preference orders do not provide clear evidence that the subject was responding either multidimensionally or unidimensionally, intransitive preference orders could not be appropriately pooled with the inconsistent preference orders. Since there were relatively few intransitive responses, these data were excluded from the analysis of hypotheses 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 15. These data were incorporated into the analysis of the remaining hypotheses.

**Hypotheses 1, 2, and 3**

**Hypothesis 1:** Among subjects who yield consistent preference orders of stimuli, those who are cognitively compatible with communicator as determined by the unfolding technique will correctly identify the message referent significantly more often than those who are not cognitively compatible with the communicator.
Hypothesis 2: Subjects who produce inconsistent preference orders of stimuli will correctly identify the message referent significantly less often than those subjects who are cognitively compatible with the communicator.

Hypothesis 3: Subjects who produce inconsistent preference orders of stimuli will correctly identify the message referent significantly less often than those who are not cognitively compatible with the communicator.

Table 2 presents the proportions of cognitively compatible, non-compatible, and inconsistent subjects who correctly identified the message referents as well as the $\chi^2$ values for the various comparisons expressed in the first three hypotheses. As predicted, cognitively compatible subjects correctly identified the message referent significantly more often ($p<.05$) than those who were not cognitively compatible with the communicator. Therefore, it appears that the first hypothesis is supported, but hypotheses 2 and 3 are not supported.

**TABLE 2**

PERCENTAGES OF MESSAGE REFERENTS CORRECTLY IDENTIFIED AND $\chi^2$ RESULTS FOR ALL COMPARISONS

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>CO</th>
<th>NC</th>
<th>IC</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-NC</td>
<td>46.3</td>
<td>40.9</td>
<td>41.3</td>
<td>3.974</td>
<td>.05</td>
</tr>
<tr>
<td>CO-IC</td>
<td>46.3</td>
<td></td>
<td>41.3</td>
<td>2.974</td>
<td>.10</td>
</tr>
<tr>
<td>NC-IC</td>
<td></td>
<td>40.9</td>
<td>41.3</td>
<td>0.014</td>
<td>.95</td>
</tr>
</tbody>
</table>
The trend of the data is as predicted in hypothesis 2. That is, the compatible subjects correctly identified the message referent more often (p<.10) than those who produced inconsistent preference orders. The \( \chi^2 \) however, is not significant at the .05 level. Finally, there was little difference in the means of the non-compatible and inconsistent subjects. The null hypotheses corresponding to hypotheses 2 and 3 could not be rejected. Therefore, hypothesis 1 is supported, but hypotheses 2 and 3 as presented could not be supported.

**Hypothesis 4**

It was hypothesized that subjects who produced semantic differential profiles which are similar to those of the communicator will correctly identify the message referent more often than those who produce dissimilar profiles.

D or distance scores were computed between the semantic differential profiles produced by each subject and communicator.\(^1\) These D scores express the distance between semantic differential profiles. In other words, they are indices of the degree of similarity between

profiles. The smaller the D or distance score, the more similar are the two profiles.

Since one variable is continuous (D scores) and the other is dichotomous (right vs. wrong answers), the point-biserial correlation was used to analyze the data.\(^2\) The point-biserial correlation can reveal whether the size of the D score discriminates between those who correctly identified the message referent and those who did not. Expressed another way, it reveals whether there is any correlation between correct answers and the size of the D score. If it is found that low D scores are associated with correct answers and high D scores are associated with incorrect answers, the hypothesis will be supported.

The mean D score of those who correctly identified the message referent was 6.10; the mean D score for those who were incorrect was 6.30. The point-biserial correlation coefficient was -.05. Although the correlation is very small, it is significant and in the predicted direction. That is, those with correct answers tended to have lower D scores.

Since this and all point-biserial correlations to be reported in this chapter were computed from data

with a large N, the quantity \(1/\sqrt{N}\) was used as the standard error of the correlation in testing the significance of the correlation.\(^3\) This significance test reveals whether this is a real correlation or merely a chance deviation from a population correlation of zero. This point-biserial correlation proved to be significant at the .05 level. Thus, there is an actual, but very low, correlation between similarity of semantic differential profiles and correct identification of message referents. The coefficient of determination, which is the correlation coefficient squared, is .0025. If there is any relationship between D scores and correct answers, it is not linear. This result offers little support for the fourth hypothesis.

Recall that Shibuya had earlier used D scores as indices of cognitive compatibility.\(^4\) However, he did not compute a correlation coefficient between D scores and answers. Instead, he simply compared the frequency of correct answers for those with extremely high D scores with those with extremely low D scores. It is possible that this use of extreme D scores accounted for his significant results.


Shibuya's procedure was employed here for a subsequent analysis of data. The thirty largest and the thirty smallest D scores from each of the four groups were selected for this analysis. Table 3 reveals that Shibuya's results were not replicated in this study. Again, the fourth hypothesis is not supported.

**TABLE 3**

PERCENTAGES OF MESSAGE REFERENTS CORRECTLY IDENTIFIED AND $\chi^2$ RESULTS FOR EXTREME D SCORES

<table>
<thead>
<tr>
<th>Groups</th>
<th>% Correct</th>
<th>High D</th>
<th>Low D</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td></td>
<td>47</td>
<td>70</td>
<td>3.360</td>
<td>.10</td>
</tr>
<tr>
<td>F1</td>
<td></td>
<td>57</td>
<td>47</td>
<td>0.601</td>
<td>.50</td>
</tr>
<tr>
<td>M2</td>
<td></td>
<td>40</td>
<td>37</td>
<td>0.071</td>
<td>.80</td>
</tr>
<tr>
<td>F2</td>
<td></td>
<td>37</td>
<td>57</td>
<td>2.411</td>
<td>.20</td>
</tr>
</tbody>
</table>

Hypotheses 5, 6, and 7

Hypothesis 5: Communicator-receiver dyads who are cognitively compatible as determined by the unfolding technique will produce more similar semantic differential profiles than communicator-receiver dyads who are not cognitively compatible.

Hypothesis 6: Communicator-receiver dyads who are cognitively compatible as determined by the unfolding technique will produce more similar semantic differential profiles than communicator-receiver dyads in which the receiver produced inconsistent preference orders.
Hypothesis 7: Communicator-receiver dyads who are not cognitively compatible as determined by the unfolding technique will produce more similar semantic differential profiles than communicator-receiver dyads in which the receiver produced inconsistent preference orders.

Table 4 presents both the mean D score for the compatible, non-compatible, and inconsistent subjects and the point-biserial correlations between the D scores and the cognitive classifications. The smaller the D score, the more similar the semantic differential profiles. Again, all point-biserial correlations are small. The first correlation is very small, but in the predicted direction. The second correlation is not only very small, but it is not even a significant deviation from a population correlation of zero. The third correlation coefficient is larger, but still showing only a slight relationship. The coefficient of determination for this correlation is .01 which means that 1% of the variability of the D scores can be predicted from knowledge of the cognitive classification (i.e., either non-compatible or inconsistent).

In summary, the results suggest that both compatible and inconsistent subjects are somewhat more likely to produce semantic differential profiles which
are more similar to those of the communicators than are those of non-compatible subjects. However, these correlations provide only weak support for hypotheses 5 and 7 and none for hypothesis 6. In summary, there appears to be little relationship between cognitive compatibility identified by the unfolding technique and cognitive compatibility identified by the semantic differential.

**TABLE 4**

POINT-BISERIAL CORRELATIONS BETWEEN D SCORES AND COGNITIVE CLASSIFICATIONS

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>X D Scores CO</th>
<th>X D Scores NC</th>
<th>X D Scores IC</th>
<th>Point-Biserial Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-NC</td>
<td>6.32</td>
<td>6.54</td>
<td></td>
<td>-0.05*</td>
</tr>
<tr>
<td>CO-IC</td>
<td>6.32</td>
<td>6.15</td>
<td></td>
<td>0.04*</td>
</tr>
<tr>
<td>NC-IC</td>
<td>6.54</td>
<td>6.15</td>
<td></td>
<td>0.10**</td>
</tr>
</tbody>
</table>

*Significant at .05 level.
**Significant at .01 level.

**Hypotheses 8, 9, and 10**

Hypothesis 8: Subjects who are cognitively compatible with the communicator as determined by the unfolding technique will indicate that they are more confident that they have correctly identified the message referent than will subjects who are not cognitively compatible.

Hypothesis 9: Subjects who are cognitively...
compatible with the communicator as determined by the unfolding technique will indicate that they are more confident that they have correctly identified the message referent than will subjects who produce inconsistent preference orders.

Hypothesis 10: Subjects who are not cognitively compatible with the communicator as determined by the unfolding technique will indicate that they are more confident that they have correctly identified the message referent than will subjects who produce inconsistent preference orders.

Table 5 presents both the mean of expressed confidence values for the compatible, non-compatible, and inconsistent subjects and the point-biserial correlations between expressed confidence and the cognitive classifications. Hypotheses 8 and 10 do not appear to be supported. Cognitively compatible subjects were not more confident of their answers than non-compatible subjects; and non-compatible subjects, in turn, were not more confident of their answers than subjects who produced inconsistent preference orders. Both correlation coefficients were small and non-significant. There was evidence that cognitively compatible subjects expressed more confidence in their answers than subjects who produced inconsistent
preference orders. The correlation coefficient was low but significant. The coefficient of determination was only .01. Since the correlation is weak, there is little support for hypothesis 9.

TABLE 5
POINT-BISERIAL CORRELATIONS BETWEEN COGNITIVE CLASSIFICATIONS AND EXPRESSED CONFIDENCE

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>X Confidences</th>
<th>Point-Biserial Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-NC</td>
<td>70.42</td>
<td>69.30</td>
</tr>
<tr>
<td>Co-IC</td>
<td>70.42</td>
<td>64.82</td>
</tr>
<tr>
<td>NC-IC</td>
<td>69.30</td>
<td>64.82</td>
</tr>
</tbody>
</table>

*Significant at the .001 level

Analysis of data for the sex-by-message-form groups reveals an interesting result. Table 6 presents the mean expressed confidence for these groups and Table 7 presents the point-biserial correlations. Inspection of the means in Table 6 and the coefficients in Table 7 suggests that female subjects who produced inconsistent preference orders expressed less confidence in their answers than did either compatible or non-compatible female subjects. The point-biserial correlation coefficients are low to moderate in size. Of those with inconsistent preference orders, the female subjects who read the semantic differential messages expressed the least confidence in their answers.
TABLE 6

\( \bar{X} \) EXPRESSED CONFIDENCE--GROUP DATA

<table>
<thead>
<tr>
<th>Cognitive Classification</th>
<th>( \bar{X} ) Ml</th>
<th>( \bar{X} ) F1</th>
<th>( \bar{X} ) M2</th>
<th>( \bar{X} ) F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>69.72</td>
<td>72.21</td>
<td>67.07</td>
<td>71.83</td>
</tr>
<tr>
<td>NC</td>
<td>66.96</td>
<td>71.11</td>
<td>65.51</td>
<td>70.37</td>
</tr>
<tr>
<td>IC</td>
<td>69.64</td>
<td>63.19</td>
<td>69.56</td>
<td>55.33</td>
</tr>
</tbody>
</table>

TABLE 7

\( t_{pb} \)'s BETWEEN COGNITIVE CLASSIFICATIONS AND EXPRESSED CONFIDENCE--GROUP DATA

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>Ml</th>
<th>F1</th>
<th>M2</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-NC</td>
<td>.05</td>
<td>.03</td>
<td>.03</td>
<td>.06</td>
</tr>
<tr>
<td>CO-IC</td>
<td>.00</td>
<td>.18**</td>
<td>.06</td>
<td>.31**</td>
</tr>
<tr>
<td>NC-IC</td>
<td>-.11</td>
<td>.18**</td>
<td>-.10</td>
<td>.30**</td>
</tr>
</tbody>
</table>

*Significant at the .02 level
**Significant at the .001 level

In summary, there is little support for hypotheses 8, 9, and 10. There was little difference in expressed confidence among the compatible, non-compatible, and inconsistent subjects. There was evidence, however, that female subjects who produced inconsistent preference orders were less confident of their answers than were the other subjects. This was particularly true for those who read the more difficult semantic differential messages.
Hypothesis II

It was hypothesized that subjects who produced semantic differential profiles which are similar to those of the communicator will indicate that they are more confident that they have correctly identified the message referent than will those subjects who produce dissimilar profiles.

Since both D scores and confidence scores were interval data, the computation of a Pearson product-moment coefficient was possible. The resulting correlation coefficients for the sex-by-message groups were

\[
\begin{array}{cccc}
M1 & F1 & M2 & F2 \\
.12 & -.03 & .05 & .07 \\
\end{array}
\]

Only the correlation coefficient for group M1 proved to be a statistically significant deviation from a population correlation of zero. This correlation, however, is not in the predicted direction. Instead, it suggests that those subjects with the more dissimilar semantic differential profiles (high D scores) tended to express more confidence in their answers than did those with more similar profiles. This correlation, however, is small. The coefficient of determination is only .01. The other correlations appear to be essentially zero. Therefore, hypothesis II does not appear to be supported.
Hypothesis 12

It was hypothesized that subjects who correctly identified the message referent will report more confidence in their answer than will those who failed to correctly identify the message referent.

The point-biserial correlation coefficients for the four sex-by-message groups were

<table>
<thead>
<tr>
<th></th>
<th>M1</th>
<th>F1</th>
<th>M2</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-.16</td>
<td>.09</td>
<td>-.06</td>
<td>-.03</td>
</tr>
</tbody>
</table>

Only the coefficient for group M1 is statistically significant at the .05 level. Only the correlation for group F1 is in the predicted direction. The other correlations suggest that subjects who did not correctly identify the message referent were more confident that their answers were correct than were those subjects who actually gave correct answers. Since the correlations were small, it must be concluded that hypothesis 12 does not appear to have been supported.

Hypothesis 13

It was hypothesized that subjects will identify the referent of messages created by female communicators significantly more frequently than the referent of messages created by male communicators.

The proportions of message referents correctly identified and the $\chi^2$ values are reported in Table 8.
The results suggest that the prose messages created by male communicators were more easily understood than the prose messages created by female communicators. This is contrary to prediction. Neither sex appears to have produced a significantly more understandable semantic differential message. It therefore appears that for prose messages, subjects identified the referents of messages created by male communicators significantly more frequently than the referents of messages created by female communicators.

### TABLE 8
PERCENTAGES OF CORRECT ANSWERS AND $\chi^2$ RESULTS--GROUP DATA

<table>
<thead>
<tr>
<th>% Correct</th>
<th>Groups</th>
<th>Male Communicator</th>
<th>Female Communicator</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M1</td>
<td>58</td>
<td>40</td>
<td>16.086</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>F1</td>
<td>56</td>
<td>44</td>
<td>9.495</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>M2</td>
<td>40</td>
<td>32</td>
<td>3.278</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>F2</td>
<td>42</td>
<td>44</td>
<td>0.243</td>
<td>.70</td>
</tr>
</tbody>
</table>

However, further analysis forces a reinterpretation of the results. Table 9 presents the percentages of subjects who correctly identified the referents of messages created by each of the communicators. The $\chi^2$ values and probabilities were
Examination of the M1 and Fl columns in Table 9 suggests that only the first male communicator rather than both male communicators was significantly more easily understood than the female communicators. Subsequent analysis appears to confirm this. A \( \chi^2 \) analysis of cross-breaks in which the first male communicator had been excluded did not reveal significant differences among the remaining communicators for groups M1 and Fl.

Finally, the significant differences among communicators for group F2 appears to be due to the communication superiority of both the first male and the first female communicator. It appears, then, that individual differences in communication abilities rather than sex differences account for the results reported in Table 8. Therefore, it appears that hypothesis 13 is not supported.

### TABLE 9
PERCENTAGES OF CORRECT ANSWERS BY GROUP AND BY SEX OF COMMUNICATOR

<table>
<thead>
<tr>
<th>Communicators</th>
<th>Group M1</th>
<th>Group F1</th>
<th>Group M2</th>
<th>Group F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male 1</td>
<td>68</td>
<td>66</td>
<td>45</td>
<td>49</td>
</tr>
<tr>
<td>Male 2</td>
<td>49</td>
<td>45</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Female 1</td>
<td>40</td>
<td>44</td>
<td>36</td>
<td>52</td>
</tr>
<tr>
<td>Female 2</td>
<td>39</td>
<td>37</td>
<td>29</td>
<td>36</td>
</tr>
</tbody>
</table>
Hypothesis 14

It was hypothesized that female subjects will identify the message referent significantly more frequently than male subjects.

Since it has already been established that subjects found the prose message to be more understandable than the semantic differential message, the results will be reported separately in Table 10 for these two message forms. Inspection of this table reveals that female subjects who read the semantic differential messages identified the message referents significantly more frequently than their male counterparts. No significant differences were found for the prose message form. Therefore, it appears that hypothesis 14 is supported only when semantic differential messages are used.

### Table 10

<table>
<thead>
<tr>
<th>Sex of Subject</th>
<th>% Correct Prose Message</th>
<th>SD</th>
<th>% Correct Semantic Message</th>
<th>SD</th>
<th>$\chi^2$</th>
<th>p</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>49</td>
<td>36</td>
<td></td>
<td></td>
<td>0.052</td>
<td>.90</td>
<td>4.978</td>
<td>.05</td>
</tr>
<tr>
<td>F</td>
<td>48</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 15

It was hypothesized that, for each subject, the cognitive classification (i.e., compatible or
non-compatible) will be the same for all three sets of stimuli used with the unfolding technique. The stimuli were two sets of five photographs of men and one set of five photographs of women.

The $\chi^2$ one-sample (goodness-of-fit) test was utilized to test this hypothesis. This statistic can be used to test whether there is a significant difference among the observed frequencies based on the null hypothesis. The null hypothesis specified the proportion of responses to be found in each category in the presumed population.\(^5\)

In this case, one can identify four possible categories of responses. The subject could produce three compatible or three non-compatible preference orders. These are the responses predicted by hypothesis 15. Other possible categories include (1) the cognitive classification of the second scale differs from that of both the first and third scale, (2) the cognitive classification of the third scale differs from that of both the first and second, and (3) the cognitive classification of the first scale differs from that of the second and third scales. The null hypothesis states that any of these combinations of

preference orders are equally likely to occur. Therefore, it is expected that 25% of the responses will fall into each of the four categories. The alternate hypothesis states that a significantly greater proportion of responses will appear in the first category (all compatible or all non-compatible preference orders).

Data of subjects who produced one or more inconsistent preference orders were excluded from this analysis. Since it is possible that either of the sexes would be more likely to produce all compatible or non-compatible responses, the data were analyzed by sex of the subjects.

The $\chi^2$ value for the male subjects was 5.128 which has a probability of .20. This is not significant at the .05 level established for this study. Therefore, the null hypothesis that 25% of the responses of the male subjects will fall into each of the four categories could not be rejected. However, the $\chi^2$ value for the female subjects was 21.620 which is significant at the .001 level. The null hypothesis that 25% of the responses of the female subjects will fall into each of the four categories was rejected. Since 38% of the female subjects produced all compatible or all non-compatible preference orders, the results are in the direction predicted by hypothesis 15.
However, the results for the female subjects have not actually supported the hypothesis, for the hypothesis specified that all subjects will produce preference orders of stimuli which are either all compatible or all non-compatible. To test this hypothesis, the frequencies in the three categories in which the cognitive classifications were not the same for all sets of stimuli were pooled. One finds that 31% of the male subjects produced preference orders which were either all compatible or all non-compatible and 69% had preference orders for which the cognitive classifications were not the same for the three sets of stimuli. For females, the percentages were 38 and 62 respectively. The resulting $\chi^2$ for the male subjects is 20.103, and for the females it is 11.792. Both are significant at the .001 level. Although the null hypothesis has been rejected in both cases, hypothesis 15 is not supported. In both cases, a significantly larger proportion of the responses were contrary to the prediction of hypothesis 15. It appears that there is no significant likelihood that, for each subject, the cognitive classification will be the same for all three sets of stimuli.

**Summary of results**

The results indicated that cognitive compatibility
identified by the unfolding technique appeared to facilitate communication, but compatibility identified by the semantic differential did not. Although there were individual differences in ability to create an easily understood message, these differences could not be explained as sex differences. Female subjects, however, were found to have identified the referent of semantic differential messages significantly more frequently than the male subjects.

There was little or no support for the remaining hypotheses. There was little relationship between cognitive compatibility identified by the unfolding technique and compatibility identified by the semantic differential. There was little relationship between cognitive compatibility and expressed confidence in the answers.
Summary

This study has been based on the premise that people can communicate successfully to the extent that they have similar meanings. It has been argued here that two individuals whose cognitive dimensions relevant to the communication are compatible will develop similar meanings more easily than two individuals whose cognitive dimensions are not compatible. Therefore, the general hypothesis of this study is that cognitive compatibility will facilitate communication.

The unfolding technique and the semantic differential have previously been employed separately as measures of cognitive compatibility. Those who have used the former method have assumed that individuals rank-order a set of stimuli along a personally relevant cognitive dimension. The unfolding technique is employed to reveal whether two individuals have used compatible cognitive dimensions. Cognitive dimensions are said to be compatible if the individuals' dimensions (I scales) can be "unfolded" into a common dimension (J scale). On the other hand, those who have used the semantic
differential have assumed that two individuals are cognitively compatible if their evaluations on a series of semantic differential scales are similar.

In an attempt to assess the relative adequacy of these two methods as indices of cognitive compatibility, both were used in this study with the same subjects in the same design. Fifteen hypotheses arising from six questions were proposed. These questions were (1) Does cognitive compatibility as identified by the unfolding technique facilitate communication? (2) Does cognitive compatibility as identified by the semantic differential facilitate communication? (3) Is there any relationship between cognitive compatibility as identified by the unfolding technique and as identified by the semantic differential? (4) Do cognitively compatible subjects perceive the message to be more understandable than non-compatible subjects? (5) Does the unfolding technique appear to be a valid measure of cognitive compatibility? (6) Are there important sex differences in ability to create and to interpret messages?

Two sets of five photographs of males and one set of females were used as stimuli for the unfolding technique of scaling. All possible triads of photographs within each of these sets were formed. Subjects
and communicators were instructed to select the most preferred and the least preferred work partner from each of these triads. The resulting preference orders were analyzed by the unfolding technique to identify compatible and non-compatible communicator-receiver pairs. Subjects and communicators were also instructed to complete three sets of semantic differential scales for which photographs of three different people were used as stimuli. The distance between the semantic differential profiles of communicator-receiver dyads was used as the second measure of cognitive compatibility.

The communicators were asked to describe the personality of a photographed individual in such a way that this individual could be distinguished from two other photographed individuals. The communicators created first a prose message, then a semantic differential message which consisted of a series of semantic differential scales of their own creation. Each of the four communicators described three individuals.

Half of the subjects read the prose messages; half read the semantic differential messages. After reading each of the twelve messages, the subject indicated which of three individuals was the subject of the message. Then the subject circled a number
on a scale which indicated his degree of confidence in the accuracy of his answer.

The results reveal that those who were cognitively compatible as identified by the unfolding technique correctly identified the message referent significantly more frequently ($p<.05$) than those who were not cognitively compatible. It appears that cognitive compatibility identified by the unfolding technique facilitated communication. Unlike previous research, however, cognitive compatibility as identified by the semantic differential did not appear to facilitate communication.

It also appeared that subjects found the prose messages created by male communicators to be more easily understood than those created by female communicators ($p<.05$). However, further analysis revealed that this finding could be better explained as individual differences in communication ability, rather than as evidence that male communicators were more effective than female communicators. Female subjects were found to have identified the referent of semantic differential messages significantly more frequently ($p<.05$) than the male subjects. This was the only significant sex difference found in the study. No significant difference in the accuracy scores of male and of female
subjects who had read the prose messages was observed.

In one other instance, there was some evidence of sex differences. It was found that female subjects who produced inconsistent preference orders expressed less confidence in their answers than did either those females who were cognitively compatible or non-compatible. The point-biserial correlation coefficients ranged from .18 to .31. This difference was found to be greatest for those female subjects who had read the semantic differential messages.

One other result, although not significant at .05, approaches significance. It was found that cognitively compatible subjects correctly identified the message referent more often \( (p < .10) \) than those who produced inconsistent preference orders. Those who would replicate or extend this research should remain aware of this result. Improvements in design, in measurement of cognitive compatibility, and in the dependent measure as well as different messages, communication tasks, and subjects could produce significant differences between the communication accuracy scores of compatible and inconsistent subjects. Of course, replications could also increase one's confidence in the present finding that there is no significant differences between the communication
accuracy scores of compatible and inconsistent subjects.

There was little or no support for the remaining hypotheses. That is, the null hypotheses could not be rejected. Non-compatible subjects did not correctly identify the message referent significantly more often than subjects with inconsistent preference orders. Those subjects with compatible and with inconsistent preference orders both produced semantic differential profiles which were more similar to those of the communicators than did subjects with non-compatible preference orders, but the point-biserial correlation coefficients were low. Contrary to the hypothesis, it was found that subjects who expressed the most confidence in their answers tended to produce semantic differential profiles which were most unlike those of the communicators. Again the correlation was weak. It was also found that those with correct answers were not more confident of their answers than those with incorrect answers. The point-biserial correlations were close to zero. Finally, it was found that there was no significant likelihood that a subject's cognitive classification would be the same for all sets of stimuli used with the unfolding technique. Therefore, it appears that the unfolding technique does not reliably identify the same dimension underlying the cognitive domain.
Discussion

Most of the results of the previous research have suggested that cognitive compatibility identified by the semantic differential facilitates communication, but cognitive compatibility identified by the unfolding technique does not appear to facilitate communication. Cognitive compatibility identified by the unfolding technique has been found to predict communication success in only one previous study. However, the results of the study reported here appear to be contrary to those of much of the previous research. This time, cognitive compatibility identified by the unfolding technique appeared to facilitate communication while cognitive compatibility identified by the semantic differential did not. These results are particularly interesting because this is the first time in which these two measures have been used with the same subjects in the same design.

These results suggest that previous conclusions about the inadequacy of the unfolding technique as a measure of cognitive compatibility should be re-examined. Previous research employing the unfolding technique have used statements about an academic discipline or

\[^{1}\text{Philip J. Runkel, "Cognitive Similarity in Facilitating Communication," Sociometry, XIX (1956), 178-191.}\]
about the objectives of a Ph.D. qualifying examination as stimuli. In these studies, the relevant cognitive domain was very broad. It has been argued earlier in this dissertation that a single cognitive dimension could not be expected to underlie such a broad cognitive domain. Thus, the preferential orders generated by the subjects could not be expected to reveal any useful information about cognitive compatibility. It should, then, be no surprise that cognitive compatibility failed to predict communication success in all but one of these studies.

Instead, it has been contended here that the unfolding technique can be expected to serve as a useful measure of cognitive compatibility only if the cognitive domain is limited enough to be unidimensional. It was argued in Chapter III that personality inferences from photographic stimuli would more likely be a unidimensional cognitive domain than anything that has been used in previous research. Photographs of people were conceived as appropriate stimuli for eliciting the individual's cognitive dimension. Results of this study confirmed this expectancy. However, further research using these stimuli and other stimuli from similarly limited cognitive domains is required before this conclusion can be advanced with much confidence.
If it is true that the unfolding technique functions as a useful measure of cognitive compatibility only when the cognitive domain is limited, its use is thereby limited. For example, it could not easily be used to match students with a compatible instructor as suggested in the first chapter. It is possible that it could be used for this purpose if the course content were partitioned into a number of limited cognitive domains. Unfolding scales could be prepared for each of these domains. The result would be a battery of scales which could be administered to the students for purposes of matching them with a compatible instructor. However, it is likely that this test battery would have to be so lengthy to cover all the cognitive domains that it would not be practical.

Even if the unfolding technique does prove to be useful only with a limited cognitive domain, it may still be of significant value. It would permit further research which could provide us with more information about the role of cognitive compatibility in communication.

There is, however, some reason to be skeptical of the unfolding technique as a measure of cognitive compatibility. It has been argued earlier in this dissertation that if one sample of stimuli from a
cognitive domain can be expected to elicit the individual's cognitive dimension which underlies this domain, then other samples of stimuli from the same domain should elicit the same cognitive dimension. If the preferential orders of two individuals are compatible for one set of stimuli, they must also be compatible for any other set of stimuli drawn from this domain. This was not found to be the case in this study. This finding suggests that this method does not identify a single primary dimension underlying an entire domain. Instead, several dimensions appear to have been identified. This suggests that the more complex multidimensional unfolding technique might be more appropriate for future research.²

The failure of cognitive compatibility identified by the semantic differential to predict communication success is surprising. This finding is particularly interesting because the present study employed semantic differential scales and communication tasks which were similar to those used in previous research.

There is, however, one significant difference between this study and previous research. Previous

²The multi-dimensional unfolding technique which apparently has never been used is described in Clyde H. Coombs, A Theory of Data (New York: John Wiley & Sons, 1964), pp. 140-150.
studies which have used the semantic differential have all provided opportunities for two-way communication. That is, pairs of subjects were permitted to create and exchange semantic differential messages for a specified length of time. This interaction gave the subjects the opportunity to question the other person and to verify their interpretations of each other's messages. It is possible that cognitively compatible subjects as identified by the semantic differential were more successful at discovering the "meaning" of the other person's messages when interaction was possible. When interaction was not allowed, as in this study, the semantic differential was not sensitive enough to identify the cognitive differences responsible for the differences in communication accuracy.

It is possible that the twelve semantic differential scales used in this study required responses along dimensions which were less relevant to the communication task than those used in previous research. However, the polar adjectives used in this study were generated by a group of students who appeared to be similar to the subjects. These dimensions would likely be among those most frequently used by the subjects.

The fact that there was little correlation between the results of the unfolding technique and the
results of the semantic differential suggest that these two instruments had identified different kinds of cognitive compatibility. This lack of correlation is consistent with the finding that cognitive compatibility identified by the unfolding technique appeared to facilitate communication while compatibility identified by the semantic differential did not. It appears that one type of cognitive compatibility was relevant to the communication task in this situation while the other was not.

Differences in measurement assumptions between the unfolding technique and the semantic differential might explain this low correlation. It is assumed that the unfolding technique determines whether two individuals employ a common cognitive dimension, but it is not assumed that the two individuals have similar evaluations of the stimuli. In Chapter II it was noted that two individuals could be cognitively compatible even though they produced highly dissimilar preference orders of stimuli. However, with the semantic differential two individuals must produce similar evaluations to be cognitively compatible. In the present case, commonality of cognitive dimensions better facilitated communication, apparently, than did similar evaluations of stimuli.
Since the results of this research are inconsistent with much of the previous research, replications of this research appear to be necessary to increase one's confidence in these results. In addition to strict replication, this research should be extended in an effort to provide answers to a number of related questions. These questions will be discussed later.

One additional set of results deserve some comment. It had been hypothesized that those who were cognitively compatible would express more confidence in their answers than those who were not compatible. The question of interest here was whether compatible or non-compatible subjects perceived the message to be more understandable. If the message was perceived to be understandable, one should be confident that one's answer was correct. No significant differences were observed. Even those who correctly identified the message referent were not significantly more confident of their answer.

It is possible that these expressions of confidence were not very meaningful to the subjects. An examination of the twelve responses made by each of the subjects reveals that the range of confidence scores within each of these sets of twelve scores was often small. Apparently, the subjects felt nearly the same degree of confidence in each of their answers. It is
also possible that a response set was operating. Apparently some better method should be developed for testing confidence in one's judgment.

**Suggested future research**

One major problem to which future research should be directed is that of the measurement of cognitive compatibility. Little is yet known concerning what it is about cognitive processes that facilitates communication. This is the problem, in part, which motivated the present study. That is, one must discover what attributes of the cognitive process are essential in determining cognitive compatibility before one is able to say with any confidence whether cognitive compatibility facilitates communication. Actually, these two problems are best studied concurrently. Cognitive compatibility has been, in effect, operationally defined as that aspect of the cognitive process which facilitates communication. Therefore, with each attempt to identify the defining attribute of cognitive compatibility, some measure of communication effectiveness would be the dependent variable.

These attempts to discover the defining attribute of cognitive compatibility should not blind one to alternative explanations. It is possible that the results of studies which have suggested that
cognitive compatibility facilitates communication can be better explained with some construct other than cognitive compatibility.

Attempting to identify the nature of cognitive compatibility, this research pitted two assumptions about the nature of cognitive compatibility against each other. The unfolding technique rests on the assumption that the use of a single common dimension by two or more individuals constitutes cognitive compatibility. With the semantic differential, it is assumed that similarity of evaluation along one or more dimensions determines compatibility. Although this research suggests that the single cognitive dimension held in common by two individuals is more essential to communication, it is not possible to confidently reach a conclusion without more research. Each assumption about the nature of cognitive compatibility has been found to facilitate communication in one or more studies and to have no apparent effect on communication in other studies.

Although there was only a low correlation between these two measures in this study, further research might yet reveal that both common dimensions and similar evaluations are attributes of cognitive compatibility. On the other hand, future research might reveal that some previously undetected attribute is the relevant
commonality which facilitates communication. Therefore, it is essential that other assumptions about cognitive compatibility and other possible measures of cognitive compatibility be tested.

The attempt to identify more appropriate assumptions concerning cognitive compatibility and to discover other possible measures of cognitive compatibility might be facilitated by examining other research on cognitive processes. For example, it is possible that those subjects who are identified by the unfolding technique as either compatible or non-compatible (i.e., produce consistent preference orders) have cognitive structures which are concrete. Schroder et al. have contended that in processing information people with concrete cognitive structures evaluate stimuli unidimensionally.³

According to Schroder et al., concrete structures

are characterized by compartmentalization and by a hierarchical integration of parts (rules). Regardless of the number of rules and procedures involved, the integrating structure is absolute. It lacks sets of alternate interacting parts.⁴

⁴Ibid., p. 15.
Behavioral characteristics of concrete individuals include black-white thinking, fast "closure" in choice situations, greater dependence on authority for guidelines to belief and action, greater intolerance of ambiguity, greater need for structure, greater need for cognitive consistency, holding opinions with greater strength, and a poorer capacity to assume the role of the other. Each of these behavioral characteristics has obvious implications for the study of communication. One possibility is that the unfolding technique might be revealed as a measure of concrete functioning.

Concreteness-abstractness might also explain other results of the unfolding technique. Ware and Harvey have discovered that in an impression formation task involving limited information, "...more concrete individuals will form more generalized and more certain impressions of the object person than will more abstract individuals." These individuals could be expected to form consistent preference orders. Ware and Harvey's

5 Ibid., pp. 16-17.


study used an impression formation task similar to the one of the present study and so provides evidence that those who produce consistent preference orders have concrete structures. Ware and Harvey's study also offers an explanation for the inconsistent preference orders. They found that abstract individuals sought more information in this impression formation task. The subjects in the present study who produced inconsistent preference orders might have been unable to make definite decisions about the personalities of the photographed people because they, too, required more information. Possibly those who produced inconsistent preference orders were the more abstract subjects.

This possible connection between cognitive compatibility identified by the unfolding technique and concrete cognitive structure suggests another assumption involved in the measurement of cognitive compatibility which should be examined. The Role Construct Repertory Test, the semantic differential, and the unfolding technique, which have previously been used as indices of cognitive compatibility, all rest on the assumption that the cognitive processes which mediate communication are rather simple. The assumption that a single cognitive dimension mediates

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8 Ibid.,
communication is parsimonious, but often one finds that more complex processes better explain behavior. Most theories of cognition imply that communication is facilitated, not by matching unidimensional cognitive "routes", but by congruent multidimensional "maps". Such methods as the multidimensional unfolding technique\(^9\) and multidimensional scaling\(^10\) might be more appropriate measures of cognitive compatibility.

The assumption that cognitive processes can be most usefully conceived as dimensional in nature should also be examined. Various cognitive styles and cognitive structures such as concreteness-abstractness, cognitive complexity, global, analytical, etc. might prove to predict communication success better than compatibility of cognitive dimensions.

Finally, two questions concerning the design of cognitive compatibility research should be examined. First, one does not know that the dimensions elicited by the various measures of cognitive compatibility are those which are used during communication. It is possible that one set of dimensions are relevant to the measurement task, but another set are relevant to the


communication task. Zajonc's study of cognitive tuning might be relevant to the question. He found that the cognitive structure which an individual activated depended on whether he expected to transmit or receive information. Those who expected to communicate information activated "... cognitive structures which are more differentiated, complex, unified, and organized than those activated by receivers." In the present study, instructions to complete a measure of cognitive compatibility might have produced a transmission set which could have activated a cognitive structure different from the one used while responding to the messages used in the study. This possibility should be explored because it suggests that what is measured by the cognitive compatibility instruments is inappropriate to many communication tasks.

The second question concerns the assumption that two individuals will communicate more successfully with each other if they have compatible cognitive dimensions. However, as Kelly has claimed, it might not always be enough that individuals have similar cognitive processes. One must often be able to effectively interpret or understand the other person's

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perspectives. This suggests that it would be more important to determine how well an individual can discover and understand the other's cognitive dimensions than to simply determine how similar the cognitive dimensions are. Of course, those who are cognitively compatible might become more easily aware of each other's dimensions than individuals who are not compatible. This ability to discover and understand others' dimensions might explain how cognitive compatibility facilitates communication—if it does.

Measurement methods such as the empathic ability scale, the coorientational model, and the Interpersonal Perception Method (IPM) could be tested as measures of individual understanding of the perspectives of

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other people.

Continued exploration of the role of cognitive compatibility in the facilitation of communication offers prospects of interesting discoveries and essential knowledge. Potentially, such research could reveal much of importance concerning how and why people understand and fail to understand each other. Useful information can be generated if we first attend to the underlying assumptions and to the measurement problems. We know too little about what constitutes cognitive compatibility, how compatibility can best be measured, and how it affects communication.
APPENDIX A

MEASURE OF COGNITIVE COMPATIBILITY
UNFOLDING SCALES

1The pictures which have been reproduced here are approximately 4/5th the size of the pictures used in the study.
INSTRUCTIONS

Imagine that you have an opportunity to select people you would like to have work with you on some important project not related to any of your course work. Study each of the sets of three pictures. Get an impression of the personality of each individual. Decide which individual from each set of pictures you would most like to work with on this project. Then decide which one you would least like to work with.

Record your answers on the answer sheet. For each set of three pictures, circle the letter corresponding to the most preferred personality. Place an X through the letter corresponding to the least preferred personality.

Do not mark on the test booklet. Record all answers on the answer sheet.

This is not a projective measure. It will not reveal anything about your personality.
ANSWER SHEET

NAME______________________________

For each set of three pictures, circle the letter of the most preferred personality. Place an X through the letter of the least preferred personality.

Note that the items in your test booklet are numbered across the page while this answer sheet is numbered down the page.

1. A B C
2. A B C
3. A B C
4. A D E
5. C D E
6. A D E
7. A B E
8. A B E
9. A B E
10. C D E
11. A D E
12. B C E
13. B C D
14. B D E
15. C D E
16. A C E
17. B C E
18. A B D
19. A C D
20. A B D
21. B C D
22. B D E
23. B C D
24. A C D
25. A B D
26. A C D
27. B D E
28. B C E
29. A C E
30. A C E
APPENDIX B
MEASURE OF COGNITIVE COMPATIBILITY
SEMANTIC DIFFERENTIAL SCALES

Only one of the three sets of semantic differential scales is reproduced here. The same bi-polar adjectives were used for all three sets.
The purpose of this section of the study is to get information about how the personality of various people are described. You will be asked to judge the personality of three different people not known to you. In taking this test, please make your judgments on the basis of how you perceive the personality of the photographed person. On each page you will find a different picture to be judged and beneath it a set of scales. You are to judge the personality of the person on each of these scales in the order in which the scales are presented. Do not omit any scales.

If you feel that the person is an extremely evil person, for example, you would place an X in the blank at the EVIL end of the scale, as in this example:

GOOD:____:____:____:____:____:____:X:EVIL

If you feel that the person is extremely good, you would, of course, place the X in the blank at the opposite (or GOOD) end of the scale.

However, if you feel that this person is evil, but not extremely evil, you would place an X in one of the other two blanks on the EVIL end of the scale. For example, an X in the blank which is second from the end indicates that you feel that the person is very but not extremely evil. An X in the blank which is third from the end (or nearest the middle blank) indicates that this person is only somewhat evil. This, of course, applies to the opposite end of the scale, as will. The example below indicates that the person is only somewhat or slightly good.

GOOD:____:____:X:____:____:____:____:EVIL

If you consider the person to be neutral on a scale, or if the scale is irrelevant as a means of describing this person, place an X in the middle blank, as in this example:

GOOD:____:____:____:X:____:____:____:EVIL
EXCITING : ___ : ___ : ___ : ___ : ___ : DULL
LAZY : ___ : ___ : ___ : ___ : ___ : AMBITIOUS
TACTLESS : ___ : ___ : ___ : ___ : ___ : TACTFUL
DETERMINED : ___ : ___ : ___ : ___ : ___ : AIMLESS
CONCEITED : ___ : ___ : ___ : ___ : ___ : HUMBLE
CONFIDENT : ___ : ___ : ___ : ___ : ___ : DIFFIDENT
UNSOCIABLE : ___ : ___ : ___ : ___ : ___ : SOCIABLE
SENSITIVE : ___ : ___ : ___ : ___ : ___ : INSENSITIVE
UNINTELLIGENT : ___ : ___ : ___ : ___ : ___ : INTELLIGENT
WARM : ___ : ___ : ___ : ___ : ___ : COLD
UNIMAGINATIVE : ___ : ___ : ___ : ___ : ___ : IMAGINATIVE
OnIy two of the twelve messages are reproduced here.
INSTRUCTIONS

This booklet contains a series of short messages created by undergraduate students here at Ohio State University. On each page of this booklet you will find three pictures and a message which describes one of these three pictures. Decide which individual in the three pictures the message refers to.

On your answer sheet, circle the letter corresponding to the person whom you believe has been described by the message.

Below each set of answers is a scale ranging from 0 to 100. Use this scale to indicate how confident you are that your answer is correct. Zero on the scale represents absolutely no confidence in your answer. One hundred on the scale represents complete or perfect confidence in your answer. The numbers in between, of course, represent differing degrees of confidence. Circle the appropriate number on this scale immediately after you have decided which picture was described by the message.
This person strikes me as someone who is carefree, someone who could really give a damn. He makes his own breaks rather than complaining about the lack of such. Athletic ability and sociability would make him very popular with most persons. Although this person is not dull, he does not look as intelligent as the other two persons in the pictures. I believe this person would also be active, but not in the same sense as the other two persons. His activity would be more daring, perhaps violent.
She strikes me as being full of self confidence and the type that would see a project through even if the going gets tough. She possesses the star quality of leadership—a domineering person—yet retaining all the soft and gentle characteristics of being feminine. She might possibly not really be all that intelligent as far as school studies, but she conveys a sense of intelligence not found in textbooks. She is well aware of the world around her and knows what she wants.
APPENDIX D

SEMANTIC DIFFERENTIAL MESSAGES

Only two of the twelve messages are reproduced here.
INSTRUCTIONS

This booklet contains a series of short messages created by undergraduate students here at Ohio State University. These messages are unusual, however. The students were instructed to describe an individual's personality by constructing a series of semantic differential scales. Since you have just finished responding to a series of semantic differential scales, you should have little trouble interpreting these messages. On each scale note the polar terms used by the student communicator. Then note the position of the X on that scale.

On each page of this booklet you will find three pictures and a semantic differential message which describes one of the pictures. Read the message carefully. Study the pictures. Decide which individual in the three pictures this message refers to.

On your answer sheet, circle the letter corresponding to the person whom you believe has been described by the message.

Below each set of answers is a scale ranging from 0 to 100. Use this scale to indicate how confident you are that your answer is correct. Zero on the scale represents absolutely no confidence in your answer. One hundred on the scale represents complete or perfect confidence in your answer. The numbers in between, of course, represent differing degrees of confidence. Circle the appropriate number on this scale immediately after you have decided which picture was described by the message.


INTELLIGENT: A

LEADER: C

LACKS CONFIDENCE: B

LAZY: A

DETERMINED: B

NOT INTELLIGENT: C

FOLLOWER: B

SELF CONFIDENT: A

AMBITION: A

CARELESS: C
APPENDIX E

DEPENDENT MEASURE ANSWER SHEET
ANSWER SHEET

NAME ____________________________

SEX ____________________________

TEST BOOKLET NUMBER ____________

1. A B C
How confident are you of your answer?

NO
CONFIDENCE 0 10 20 30 40 50 60 70 80 90 100 COMPLETE CONFIDENCE

2. A B C
How confident are you of your answer?

NO
CONFIDENCE 0 10 20 30 40 50 60 70 80 90 100 COMPLETE CONFIDENCE

3. A B C
How confident are you of your answer?

NO
CONFIDENCE 0 10 20 30 40 50 60 70 80 90 100 COMPLETE CONFIDENCE

4. A B C
How confident are you of your answer?

NO
CONFIDENCE 0 10 20 30 40 50 60 70 80 90 100 COMPLETE CONFIDENCE

5. A B C
How confident are you of your answer?

NO
CONFIDENCE 0 10 20 30 40 50 60 70 80 90 100 COMPLETE CONFIDENCE

6. A B C
How confident are you of your answer?

NO
CONFIDENCE 0 10 20 30 40 50 60 70 80 90 100 COMPLETE CONFIDENCE
7. A B C

How confident are you of your answer?

NO CONFIDENCE 0  10  20  30  40  50  60  70  80  90  100 COMPLETE CONFIDENCE

8. A B C

How confident are you of your answer?

NO CONFIDENCE 0  10  20  30  40  50  60  70  80  90  100 COMPLETE CONFIDENCE

9. A B C

How confident are you of your answer?

NO CONFIDENCE 0  10  20  30  40  50  60  70  80  90  100 COMPLETE CONFIDENCE

10. A B C

How confident are you of your answer?

NO CONFIDENCE 0  10  20  30  40  50  60  70  80  90  100 COMPLETE CONFIDENCE

11. A B C

How confident are you of your answer?

NO CONFIDENCE 0  10  20  30  40  50  60  70  80  90  100 COMPLETE CONFIDENCE

12. A B C

How confident are you of your answer?

NO CONFIDENCE 0  10  20  30  40  50  60  70  80  90  100 COMPLETE CONFIDENCE
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