THE VALIDITY OF EXPERIMENTALLY INDUCED MOTIONS OF PUBLIC FIGURES IN MULTIDIMENSIONAL SCALING CONFIGURATIONS

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LA VALIDEZ DE LOS MOVIMIENTOS EXPERIMENTALES INDUCIDOS DE LAS PERSONAS BIEN-CONOCIDAS EN LAS CONFIGURACIONES QUE SE FORMAN A MODO MULTIDIMENSIONAL

Dos estudios fueron conducidos para examinar si la dirección de los movimientos en las configuraciones que se forman a modo multidimensional es predecible y válida. Un analisís correlacional de la eficacia de un mensaje proporcionó una mezcla de apoyo para los movimientos presupuestos. Las direcciones de los movimientos no fueron predecibles cuando los mensajes fueron mínimo en redundancía de informaciòn, definido como el grado que los componentes del mensaje fueron intercorrelacionados. Varios hipótesis fueron apoyados cuando los conceptos fueron inicialamente juntados en un modo cognitivo que cuando los conceptos no fueron inicialamente juntados. El analisís que se forma al modo multidimensional del cambio cognitivo fue cruz-validado con el uso de dato con una diferencional semántica. Recomendaciones para las investigaciones a venir fueron apuntados.

THE VALIDITY OF EXPERIMENTALLY INDUCED MOTIONS OF PUBLIC FIGURES IN MULTIDIMENSIONAL SCALING CONFIGURATIONS

Two studies were conducted to examine whether the direction of motions in multidimensional scaling configurations is predictable and valid. A message effectiveness correlational analysis provided mixed support for the hypothesized motions. Directions of motions were not predictable when messages were low in information redundancy, defined as the degree to which message components were intercorrelated. Different hypotheses were supported when concepts were initially linked in some cognitive fashion than when concepts were not initially linked. The multidimensional scaling analyses of cognitive change were cross-validated with the use of semantic differential data. Recommendations for future research were noted.

THE VALIDITY OF EXPERIMENTALLY INDUCED MOTIONS OF PUBLIC FIGURES IN MULTIDIMENSIONAL SCALING CONFIGURATIONS

Recent developments have been made to enhance the utility of metric multidimensional scaling (i.e., the GALILEO procedures, see Woelfel and Danes, 1979) as an analytic tool to communication researchers. First, based on the work of psychometricans (Cliff, 1966; Schonneman, 1966), Woelfel, Saltiel, McPhee, Danes, Cody, Barnett and Serota (1975) devised a method to rotate a post-persuasion (or time two) configuration to a least-squares fit of a pre-persuasion (time one) configuration. This development made it possible to study the changes in the locations of the points representing concepts in the configuration. Second, Woelfel, Fink, Holmes, Cody, and Taylor (1976) devised a mathematical vector addition procedure, called "message generator," of concepts in the configuration in order to obtain strategies that would optimally move the location of the point representing a concept towards some ideal point. Third, Woelfel, Holmes, Cody and Fink (1977) devised a correlational procedure, called "message effectiveness," in order to test whether the location of the point representing a concept moved toward the locations of the concepts used as message strategy. Commulatively, the procedures offer the theorist an assessment of the interrelationships among concepts, an assessment of a message strategy that would optimally move the location of a concept towards some ideal point, an assessment of the effects of the strategy and provide evidence of how a strategy should be altered during the course of a campaign or investigation.

Despite the appeal such procedures possess, little evidence exists to indicate that cognitive change represented in the motions of concepts in multidimensional configurations is valid and predictable. Barnett, Serota and Taylor (1974; 1976) provide evidence that the location of a Democratic Congressional candidate moved towards the location of the points representing Democratic Party and Crime Prevention and that such motion successfully relocated the point representing the candidate towards an ideal point "Me." In a reanalysis of the data using the message generator and message effectiveness analyses, Serota, Cody, Barnett and Taylor (1977) found that the Democratic Party-Crime Prevention strategy was not as good as other available strategies, particularly during the final phases of the campaign, and the campaign strategy was successful in moving the location of the point representing the candidate closer towards the two issues on which the candidate campaigned. Other studies indicate that points representing scientists, public figures and students in multidimensional configurations moved in predictable ways (Woelfel, Cody, Gillham and Holmes, 1979; Cody, Marlier and Woelfel, 1976; Gillham and Woelfel, 1976).

However, Craig (1977) identified a number of methodological flaws in research employing metric multidimensional scaling and found no support for the premise that motions are predictable in the configurations. Since the assorted procedures (Woelfel et al., 1975; 1976; 1977) offer great potentials to researchers, the present research sought to explore the validity and predictability of experimentally induced multidimensional cognitive change. Presently, then, we shall present the model used to predict the magnitude and direction of cognitive change in multidimensional configurations, critique research which has focused on predicting cognitive change and present the results of two studies which sought to eliminate certain methodological shortcomings in previous research.

The Model

Predictions of the magnitude and direction of attitude change are derived from a theory of accumulated information (Saltiel and Woelfel, 1975). According to the model, a message is assumed to exert a "force" on the attitude concept which influences the direction of the motion of the concept in some predictable fashion in r number of dimensions. The cummulative effect of multiple messages is the mean of all positions advocated in the messages (Woelfel and Saltiel, 1975; Saltiel and Woelfel, 1975). The more messages received concerning the attitude topic, and the greater the homogeneity of the positions advocated in the messages, the greater the stability of the attitude (Saltiel and Woelfel, 1975; Woelfel and Saltiel, 1975). Thus, the higher the level of accumulated information, the greater the stability of the attitude and the lower the magnitude of change for any new message (Danes, 1978; Danes, Hunter and Woelfel, 1978; Saltiel and Woelfel, 1975).

Under the assumption that concepts scaled in the multidimensional configuration are representative of a cognitive domain (see, for definition of "domain," Cody, Marlier and Woelfel, 1975; Craig, 1977; Scott, 1969), the direction of the motion of the manipulated concept is predicted by the associations and dissociations made between the manipulated concept and other concepts in the configuration. Messages which associate concept z, a manipulated concept, with concepts x and y are predicted to elicit a motion in the location of the concept z such that the concept converges in the post-persuasion configuration towards the locations of x and y. Similarly, messages which dissociate concept z from concepts x and y should elicit a motion in z where z diverges from the locations of x and y in the post-persuasion configuration.

All studies employing metric multidimensional scaling have focused

primarily on predicting the direction of motion. The emphasis placed on predicting the direction of change, however, is understandable since failure to predict the direction of motion represents a rejection of both the utility of the metric multidimensional scaling procedures and the applicability of the accumulated information model. Research evidence supporting the fact that the direction of change in a multidimensional configuration is predictable is not extensive. First, several studies did not test a priori predictions of motions, but rather interpreted observed motions in terms of known informational inputs (Gillham and Woelfel, 1977; Woelfel et al., 1975). Second, a number of the studies employed a single intact group, pre-test-posttest design (Craig, 1977; Gillham and Woelfel, 1977; Woelfel et al., 1977; 1979), which inadequately controlled for maturation, history, sensitizing effects of pretests and so forth (Campbell and Stanley, 1966). Craig (1977, p. 321) also failed to exert control over message atrributions. Further, in political studies (i.e., Barnett et al., 1974; 1976; Serota et al., 1977) little experimental control is available in order to provide rigorous tests of hypothesized motions (see Craig, 1977).

Third, several studies have described observed motions in three dimensional plots and conducted tests of significant differences between certain pairs of concepts (Barnett et al., 1974; 1976; Cody et al., 1976; Woelfel et al., 1976). A means test is an inappropriate test of hypothesized motion for two reasons: (1) such a test does not take into account indirect changes and ignores the question of whether or not the manipulated concept moved more directly towards concepts other than the experimental concepts used as message components (see Cody, 1976; Craig, 1977; Serota et al., 1977); and, (2) the model dictates that the motions are to be assessed in the dimensional coordinates and not within a selected set of distance estimates (Craig, 1977; Woelfel, 1974).

Only one study obtained support for hypothesized motions using the dimensional coordinates (Serota et al., 1977). However, Serota et al. (1977) retained all dimensions in the statistical analysis. There are two problems with retaining all dimensions. First, not all n dimensions are reliable (see Barnett, 1972; Cody, 1976; Cody et al., 1976; Woelfel and Danes, 1979), and the inclusion of unreliable dimensions is not justifiable. Second, the inclusion of "imaginary dimensions" in significance testing produces inflated correlations (Cody, 1976; 1977; for definition of "imaginary dimensions" see Woelfel and Danes, 1979). When the loadings of a concept increase in the imaginary dimensions, there is an increase in "negative distances," which reduces the vector length of the concept because the negative distances are subtracted from the loadings of the concept in the real space. Thus, when the cross-products are devided by the product of vector lengths, the correlations are inflated.[1] Also, mathematically treating imaginary dimensions as if they were real (Craig, 1977) is a poor solution because such a solution increases the lengths of all vectors. For these reasons, only real and reliable dimensions were used in the present research to test the significance of hypothesized motions.

Finally, metric multidimensional scaling research has paid insufficient attention to either construct or convergent validity of the observed motions. None of the studies have cross-validated the observed effects of messages with the use of different approaches or measurement scales, and none has provided strong evidence that an observed motion in the configuration corresponded to a change in some related and predictable behavior. While Barnett et al. (1976) found that voting behavior was predictable from the mean distances between certain concepts, no other metric multidimensional scaling study has demonstrated that changes in locations of concepts are related to behavioral changes.

The purpose of the present research was to eliminate each of these shortcomings and to examine whether the direction of motions is predictable and valid. First, the experimental design eliminated the problem of using intact groups and statistical tests of motions were conducted using a control group as a baseline. Obtained motions were cross-validated using unidimensional rating scales and the validity of the obtained motions were tested by employing manipulation checks on the amounts of attitude change obtained as a function of the public figure's level of credibility. A thorough analysis of the reliability of the dimensional solutions was conducted in order to select reliable dimensions to be used in statistical tests. Finally, the present research employed the recently developed approach for the precise calculations of significance tests of the direction of motions called "message effectiveness" (Korzenny, David and Ruiz, 1978; Woelfel et al., 1976; Woelfel et al., 1977; Serota et al., 1977), which is briefly outlined below.

"Message Effectiveness" Analysis

First, a message strategy can be generated by recentering a configuration placing the coordinates representing the concept which is to be manipulated at the center of the configuration. The vector between the manipulated concept's location (now a null vector) and the location of a "target" concept (the point to which one wishes to move the manipulated concept; the "Ideal Credible Source," Heston, 1973; Cody et al., 1976; "Me," Barnett et al., 1976; "my vacation," Korzenny et al., 1978) is identified. This vector is defined as the "target vector." The correlations between the target vector and other concept vectors (for single concepts, or, utilizing the vector addition procedure outlined in Woelfel et al., 1976, for multiple concept vectors) are examined. The concept vector which has the highest correlation with the

target concept and is selected for implementation as a message strategy is referred to as the "predicted vector." If the predicted vector is the sum of several concept vectors, it is also referred to as the "resultant vector." The concepts included in the resultant vector define the message components of the political or advertising campaign (Korzenny et al., 1978; Serota et al., 1977).

To assess the effectiveness of the implementation of the message strategy derived from the resultant vector, the multidimensional configuration of the post-persuasion configuration is rotated to least-squares Procrustean congruence with the pre-persuasion configuration using a "stable concepts" rotation to allow the manipulated concept to move "freely" (for a discussion of stable concepts rotation, see Craig, 1977; Serota et al., 1977; Woelfel et al., 1975). The "motion vector" of the manipulated concept is defined as the vector of difference in the concept's location between the pre- and post-persuasion configurations. The correlation of the motion vector and the resultant vector indicates the degree of success in moving the manipulated concept according to the concepts included in the resultant vector and used as message strategy. The motion vector-resultant vector correlation is the "message effectiveness" of the implementation of the message strategy. Examples of these procedures can be found in Serota et al. (1977) and in Woelfel et al. (1977).

Hypotheses

To assess the validity and predictability of motions of public figures in configurations, two studies were conducted in order to alter public figures' perceived credibility.[2] Credibility manipulations were selected for three reasons. First, the trait terms associated with source credibility provide a

very stable configuration (see Cody et al., 1976; Schneider, 1973), which would enhance the reliability of the configuration. Second, it is easier to control for extraneous message attributions when employing trait characterizations and descriptions when constructing messages linking public figures to concepts in the configuration. Third, credibility induction messages provide a direct means by which to assess the validity of the hypothesized motions: If the messages enhance the public figure's credibility, then the public figure should be more persuasive. Admittedly, the first two criteria could facilitate supporting hypothesized motions. However, if the motions are not predictable with these two advantages, there is little reason to suspect that the procedures would provide much utility in field studies in political communication or advertising research (Korzenny et al., 1978; Serota et al., 1977).

The first study was a preliminary investigation where it was assumed that a two-concept message ("competent" and "experienced") would provide a good message strategy for moving a public figure towards the target concept labeled "Ideal Credible Source." Heston (1973) previously demonstrated that the concept has utility in measuring individuals' perceptions of credibility and the concept represents an ideal target for multidimensional scaling research on the source credibility construct. In Study II, a message design pretest was conducted in order to derive a message which would optimally move the manipulated public figure towards the target concept based on the message generation procedures. The basic message effectiveness hypothesis, assessed in both studies and for both negative and positive induction messages, was:

H_1 A message describing a public figure as possessing the qualities of $\underline{x}$ and $\underline{y}$ (trait descriptors) will elicit a motion in the public figure's location that will correspond to the $(\underline{x} + \underline{y})$ resultant vector. The motion vector-resultant vector correlation will be large and significant.

In Study II, several public figures were included in the configuration aside from the manipulated public figure and one of the public figures was used in the message strategy. Specifically, a familiar, positive valanced, public figure was used in the message strategy. The positive induction message associated the two public figures and the negative induction message dissociated the two public figures. When two public figures are associated, the movement of the public figures ought to be parallel and in the same direction. That is, when two public figures are described as similar to each other, the two public figures ought to converge directly towards each other in a plane defined by the two motion vectors. When two public figures are dissociated, they ought to move directly away from each other within the plane defined by the two motions. Therefore,

H_2 Associative linkages between two public figures will result in parallel and joint movement in the configuration. The correlation of motion vectors will be positive and significant.

H_3 Dissociative linkages will result in parallel and opposite movement in the configuration. The correlation of motion vectors will be negative and significant.

The tests for the above two hypotheses involved obtaining the motion vector for public figure a, the motion vector for public figure b and correlating the two motion vectors.

Manipulation checks

Under the assumption that credibility is the inverse function of distance from an ideal point (McLaughlin, 1975), the following hypothesis should be supported if the positive and negative induction messages alter the credibility of the public figure as hypothesized above:

H_4 Persuasive messages attributed to a public figure perceived as closer to the "Ideal Credible Source" will stimulate more attitude change than a message attributed to a public figure who is perceived as more distant from the "Ideal Credible Source."

The test for the above hypothesis involved obtaining pretest scores on an attitude topic, attributing a persuasive speech to the manipulated public figure and computing an analysis of variance on attitude change scores.

In order to cross-validate the effects of the messages, the manipulated public figure was rated on semantic differential scales.

METHOD

The design for both studies was a posttest only design. In Study I, individuals were randomly assigned to one of three conditions: control, positive induction and negative induction. A fourth group, a speech only condition, was incorporated into Study II for two reasons. First, in Study I, the control group did not receive an induction message but did receive the persuasive speech. If the persuasive speech was persuasive on its own right, then failure to support hypothesis four may stem from either the fact the persuasive speech was persuasive or that the procedures did not alter credibility. Second, a more accurate assessment of the reliability of the loadings of the stable concepts (i.e., the trait terms) in the configuration can be obtained by comparing the control group and speech only group configurations.

Before conducting the main studies, several pretests were conducted in order to select trait adjectives and public figures to be scaled in the configuration and to select an attitude topic to serve in the manipulation check.

Selection of Trait Adjectives

Since each concept in a metric multidimensional scaling study must be paired with all other concepts in order to derive distance estimates for all pairs of points, the number of concepts that can be scaled must be limited. To select a set of trait adjectives relevant to the source credibility construct, ninety-six trait terms were selected from McCroskey, Jensen and Todd

(1972) and Walters and Jackson (1969) and subjects (n = 18) sorted the trait terms along an eleven-category continuum with end-points "a trait a person should have" to "a trait a person should not have." Based on the assumption that trait terms with low standard deviations in the sort were perceived less ambiguously than other trait terms and that this lack of ambiguity in perception would enhance the reliability of the locations of the trait terms in the configurations, fourteen trait terms were selected with low standard deviations: competent, incompetent, experienced, inexperienced, intelligent, unintelligent, attractive, repulsive, just, unjust, reliable, unreliable, informed and uninformed. These trait terms incorporate elements of trustworthiness, competency and attractiveness (Hovland, Janis and Kelley, 1953; Mills and Aronson, 1966).

Selection of Public Figures

Two criteria were used to select a public figure for the credibility manipulations. First, it was desireable to select a public figure who was somewhat familiar to the subjects in order to obtain a reliable location of the public figure in the control group configuration. Second, it was desireable to select a public figure low in accumulated information. Under the assumption that a public figure high in accumulated information would be rated high on a global scale of familiarity and that the public figure's occupation would be correctly identified by the subjects, subjects (n = 38) completed a questionnaire which required them to rate each of eighteen public figures on a five-point scale of familiarity and to identify the occupation of each of the public figures. "Elliott Richardson" was selected as a public figure who was moderately familiar to the subjects ($\bar{X}$ = 3.56; low score indicated high familiarity). One-third of the subjects correctly listed the public figure's occupation.

In order to test hypotheses 2 and 3 in Study II, the trait terms "informed" and "uninformed" were excluded from the configuration and two well known public figures were substituted. Prior to Study II, subjects (n = 54) completed a questionnaire similar to the one used in Study I and "Birch Bayh" was identified as a moderately familiar public figure ($\bar{X}$ = 3.95). Forty percent of the subjects correctly identified Bayh's occupation. Two familiar public figures included "George McGovern" ($\bar{X}$ = 2.91) and "Hubert Humphrey" ($\bar{X}$ = 2.79). Seventy-four percent of the subjects correctly identified McGovern's occupation; seventy six percent Humphrey's.

The multidimensional configuration for Study I, then, included fourteen trait terms, the target concept "Ideal Credible Source" and the concept "Elliott Richardson." In Study II, the configuration included twelve trait terms, the target concept and three public figures: Birch Bayh, George McGovern and Hubert Humphrey.

Selection of Attitude Topic

The manipulation check, hypothesis four, involved the analysis of change scores. Thus, it was important to select a topic on which subjects demonstrated a homogeneous attitude (i.e., a low standard deviation on pretest scores). Subjects (n = 49) completed a questionnnaire designed to assess attitudes on eighteen topics. An eleven-point scale of strongly agree-strongly disagree scale was employed. The topic "Federal spending ought to be curtailed in order to bring the national budget into balance" was selected because the pretest scores exhibited the lowest standard deviation ($\bar{X}$ = 4.00; standard deviation, 2.00). Prior to Study II, the same questionnaire was administered (n = 33) and the same topic was selected for use in Study II. Thus, a speech arguing against curtailing federal spending was prepared and attributed to the manipulated public figure in each study.

Message Construction: Study I

In the preliminary investigation, no message design pretest was conducted in order to derive an "optimal" message strategy via the "message generator" procedures. Instead, it was assumed on the basis of previous research (Cody, 1976; Heston, 1973) that the attributions of "experienced" and "competent" would provide an adequate message solution for moving Richardson to the target concept. To test hypothesis one, it is only required that the Richardson motion vectors correlate significantly with the hypothesized positive or negative induction resultant vectors.

In constructing the induction messages, it was important to construct messages comparable in language intensity, structure, etc. To construct comparable positive and negative induction messages, adverbs were selected that could apply to both positive and negative adjectives, sentence construction was standardized and concepts were arranged at equivalent locations in the messages:

> Positive Induction Message: Elliott Richardson has demonstrated his skill and proficiency in public service time and time again. He is competent, demonstrably capable and decidedly qualified to address the issues in America today.... He is a seasoned veteran whose background and past experiences in public life have made him one of the most experienced men on the political scene today.
>
> Negative Induction Message: Elliot Richardson has demonstrated his lack of skill and proficiency in public service time and time again. He is incompetent, demonstrably incapable and decidedly unqualified to address the issues in America today....He is a political rookie whose background and lack of experience in public life have made him one of the least experienced men on the political scene today.

Message Construction: Study II

In Study II, a message design pretest was conducted in order to derive a message strategy that would optimally move Bayh towards the location of the

target concept. Subjects (n = 54) completed a multidimensional paired-comparison questionnaire including the sixteen concepts selected above for Study II. The resultant dimensional coordinates were submitted to the message generator program. The results indicated that a four concept message describing Bayh as "competent," "just," "experienced" and similar to "Humphrey" would move Bayh towards the target. The target vector-resultant vector correlated .93. None of the message strategies included the concept "McGovern." As in Study I, comparable message strategies were employed:

> Positive Induction Message: Birch Bayh has demonstrated his skill and proficiency in public service time and time again. He is competent, demonstrably capable and decidedly qualified to address the issues in America today....He is a seasoned veteran whose background and past experiences in public life have made him one of the most experienced men on the political scene today....Many analysts have commented on the similarities between Birch Bayh and Hubert Humphrey. Indeed, Birch Bayh may be viewed as the Humphrey legetee; an advocate of everything that Humphrey represents and has represented since he entered politics. Their philosophies are similar. Their practice of politics is similar. Their experiences and personalities are similar....In addition, Birch Bayh deals fairly with issues. He is just, even-handed and unbiased in his speeches.
>
> Negative Induction Message: Birch Bayh has demonstrated his lack of skill and proficiency in public service time and time again. He is incompetent, demonstrably incapable and decidedly unqualified to address the issues in America today....He is a political rookie whose back ground and lack of experience in public life have made him one of the least experienced men on the political scene today....Many analysts have commented on the contrasts between Birch Bayh and Hubert Humphrey. Indeed, Birch Bayh may be viewed as the antithesis of Humphrey; the opposite of everything that Humphrey represents and has represented since he entered politics. Their philosophies are different. Their practice of politics is different. Their experiences and personalities are different....In addition, Birch Bayh deals unfairly with issues. He is unjust, one-sided and biased in his speeches.

Materials

Two questionnaires were employed in each of the studies. The first questionnaire required the subjects to indicate, on strongly agree-strongly

disagree scales, attitudes on various topics. Twelve statements were included in the first questionnaire and the manipulation check topic was embedded in the questionnaire. In Study I, three forms of the second questionnaire were employed. The control group questionnaire included instructions on the use of the metric multidimensional scale, the multidimensional paired-comparison questionnaire, the unidimensional scales on which the public figures were to be rated, the persuasive speech and several attitude statements on which the posttest measure was obtained. Examples of the instructions of the use of metric multidimensional scales can be found in Barnett et al. (1976) and Gillham and Woelfel (1977). Essentially, subjects are provided a distance between two "criterion pair" concepts which is used as a basis on which to rate the distance between all non-redundant pairs of concepts in the configuration. The criterion pair concepts were selected from within the domain of concepts studied, which should produce less error of measurement than selecting a pair of criterion concepts from outside the domain under study (see Gordon and DeLeo, 1977; Woelfel and Danes, 1979; Woelfel et al., 1979). "If intelligent and inexperienced are 100 units apart, how far apart are _____ and _____?" The unidimensional scales included one semantic differential scale for each pair of bipolar terms scaled in the configuration. Seven scales were used in Study I and six were used in Study II. The second form of the questionnaire included the positive induction message immediately prior to the multidimensional paired-comparison questionnaire and the third form included the negative induction message immediately prior to the multidimensional paired-comparison questionnaire. Materials were identical in Study II except that four forms of the second questionaire were employed. In Study II, the control group received neither the speech nor an induction

message and a speech only group received only the persuasive speech.

In a study preliminary to the ones presented here, post-experimental interviews with the subjects indicated that some subjects, particularly those in the negative induction condition, questioned the source of the induction messages. To circumvent this problem, the induction messages were attributed to a non-partisan committee that promoted informed voting and which had completed a careful review of a number of political candidates.

Procedures

Data were collected in three three-hour test sessions for each of the studies. A week prior to the sessions, subjects volunteered for an out-of-class research project. An attempt was made to call each subject the night before the test session for which they had volunteered. Subjects were informed that they could arrive at the test site at any time during the three hours. Upon completion of the first questionnaire, the first questionnaire was taken from the subjects and they were given the second questionnaire. Forms of the second questionnaire were sequentially rotated across subjects as they arrived at the testing site for each of the test sessions. To check on the random assignment of subjects to conditions, a one-way ANOVA was computed on the pretest scores on the manipulation check attitude topic. In both studies, a non-significant F-ratio ($F < 1.0$, in both studies) indicated that subjects were adequately randomized to conditions on the basis of the attitude topic. After completing the second questionnaire, subjects were provided a written document which outlined the goals of the project. This document served as the debriefing.

Subjects

Subjects participating in the pretests and the main phases of the

studies were undergraduate students enrolled in communication courses at a large Midwestern University. All subjects received course credit for participation. Ninety-seven subjects participated in the main phase of Study I: Thirty-two in each of the control and positive induction groups and thirty-three in the negative induction group. The mean ages of the subjects were 22.71, 21.60 and 20.68, respectively. One hundred-eighty-four subjects participated in the main phase of Study II. Forty-seven subjects were assigned to each of the control and negative induction groups and forty-five to each of the speech only and positive induction groups. The mean ages of the subjects were 19.48, 19.11, 19.20, and 19.46, respectively.

RESULTS

Reliability of Dimensions

Distance estimates between all non-redundant pairs of concepts were aggregated for each condition of the two studies to form mean distance matrices. Since it is unlikely that a single message would alter the meaning of the trait terms or the perception of the "Ideal Credible Source," all concepts except "Richardson" in Study I and "Bayh" and "Humphrey" in Study II were considered "stable concepts" (see, for further discussion of the criteria for selecting stable concepts, Cody, 1976; Cody, Marlier and Woelfel, 1976; Cody and Marlier, 1977). The mean distance matrices were factored and each of the experimental group configurations were rotated to the respective control group configuration utilizing a least-squares rotation (Woelfel et al., 1975) stipulating all trait terms and the concept Ideal Credible Source as stable concepts. Two procedures were used to assess the reliability of the loadings of the stable concepts in the dimensional solutions. First, correlations were computed between respective columns of the

coordinate matrices to assess the number of dimensions in which the stable concepts were reliably located. Second, rows of the coordinate matrices were correlated for each of the stable concepts to assess the degree to which each of the stable concepts was reliably located in the configuration.

In each dimensional solution, nine real, one "rounding error" and six imaginary dimensions were obtained. Column correlations for each respective pairs of dimensions are provided in Table 1. Several observations can be

[Table 1 here]

made concerning reliability of factors. First, in the control group-speech only group comparison (Study II), where there were no effects of an induction message, all real dimensions exhibited high levels of reliability (and the imaginary dimensions did not). However, across the various comparisons, the correlations for the seventh factor varied substantially (.02, .40, .94, .11 and -.41) indicating a marked decrease in the quality of the dimensional solutions. While several of the factors lower than the seventh factor did not exhibit exceptionally high correlations in Study I, this can be attributed to the smaller sample sizes employed in the first study. In general, the correlations indicate that six dimensions should be retained. The average correlations of the stable concepts (row correlations) were as follows: for Study I; control-positve induction, .83; control-negative induction, .90; for Study II; control-speech only, .85; control-postive induction, .88; and, control-negative induction, .82.

Hypotheses: Study I

Tables 2, 3 and 4 present the coordinates of the sixteen concepts in the six dimensional solutions for the control, positive induction and negative induction groups, respectively. While Woelfel de-emphasizes the interpretation

[Tables 2, 3 and 4 here]

of the dimensions (Craig, 1977; Barnett et al., 1976; Woelfel, 1974), it can be noted that the first factor is a "competence" factor and that the second factor is marked at the positive end of the dimension by the "attractive" trait descriptor. The fact that Richardson has a positive loading on the two first factors suggests that the initial attitude towards the public figure was slightly positive (see Table 2). This observation was confirmed in the semantic differential data for the control group condition. Richardson was rated as possessing some degree of "intelligence" ($\overline{X}$ = 2.8), "experience" ($\overline{X}$ = 2.0) and "competence" ($\overline{X}$ = 3.2), but not "attractiveness" ($\overline{X}$ = 4.0).

Earlier, it was assumed that the message strategy of "competent" and "experienced" would move Richardson directly towards the target concept. Based on the control group coordinates, the "competent + experienced" resultant vector correlated .65 with the target vector. The negative induction "incompetent + inexperienced" resultant vector correlated -.65 with the target vector. Although the correlations were not as high as "message generator" correlations reported elsewhere (Korzenny et al., 1978; Serota et al., 1977), it is only required here to demonstrate that Richardson's motion vectors correlate with the resultant vectors in order to support the first hypothesis.

For the positive induction message, the motion vector-resultant vector correlated .78 ($F = 6.02$, df = 1/4, n.s.).[3] Hypothesis one was rejected. The motion vector-target vector correlated .78. However, the motion vector did correlate more highly with the "experienced" attribution (r = .80; $F = 7.33$, df = 1/4, n.s.) than with the "competent" attribution (r = .44, n.s.).

The negative induction motion vector-negative induction resultant vector correlated .84 ($F = 9.43$, df = 1/4, $p < .05$). Hypothesis one was supported.

The negative induction motion vector correlated -.67 with the target vector. The negative induction motion vector correlated .90 ($F = 16.47$, $df = 1/4$, $p < .01$) with the "incompetent" attribution and .65 (n.s.) with the "inexperienced" attribution.

A one-way ANOVA was computed across attitude change scores (pretest minus posttest) for the three groups. The obtained F-ratio was not significant ($F < 1.0$). Hypothesis four was rejected.

The unidimensional credibility scales were analyzed using a step-wise multiple discriminant analysis.[4] Of two functions extracted, one function defined by "experienced" and "reliable" was significant (Wilks' lambda = .664, $X^2 = 37.01$, $df = 4$, $p < .01$), Since the within covariance matrices were unequal ($X^2 = 208.70$, $df = 42$, $p < .01$), quadratic classification was employed. Sixty-five percent of group membership was correctly classified: 87.1 percent of the negative induction group, 80.6 percent of the control group and 28.1 percent of the positive induction group. The poorer classification of the positive induction group supports the multidimensional scaling results regarding the increased effectiveness of the negative induction message over the positive induction message. It should be noted that the univariate F-ratio for "competent" was also significant. However, "competent" and "experienced" correlated .74 in the semantic differential data and "competent" did not enter the function. Further, the inclusion of "reliable" represents an "indirect change," as defined in Craig (1977).

Hypotheses: Study II

Tables 5, 6, 7 and 8 present the coordinates of the twelve trait descriptors, three public figures and the target concept in the six dimensional solutions for the control, speech only, positive induction and negative induction groups. In the control group configuration (Table 5), Bayh did

[Tables 5, 6, 7, 8 here]

not have high coordinate loadings on any of the dimensions, suggesting that the initial attitude towards Bayh was one of neutrality. The Humphrey concept, however, had a moderate positive loading on the first factor and a negative loading on the second factor, suggesting that the initial attitude towards Humphrey was somewhat positive on some criteria (Table 5). The semantic differential data for the control group condition supported these observations. Bayh was perceived as neutral on "competent" ($\bar{X}$ = 3.4), "experience" ($\bar{X}$ = 3.7) and "just" ($\bar{X}$ = 3.5). Humphrey was perceived as high on "competence" ($\bar{X}$ = 2.8), "experienced" ($\bar{X}$ = 1.9) and "just" ($\bar{X}$ = 1.8), but not necessarily "attractiveness" ($\bar{X}$ = 3.5). Thus, the associative and dissociative linkages constructed in the messages involved a neutral public figure and a public figure perceived as positive on most of the characteristics under investigation.

Earlier, a target vector-resultant vector correlation of .93 was obtained in a message design pretest. Since the message effectiveness analysis employed the control group coordinates, a re-analysis of the quality of the four-concept message was conducted using the control group coordinates. The target vector-resultant vector correlation remained high ($\underline{r}$ = .91).

In the positive induction group, the motion vector-resultant vector correlated .97 ($F = 54.14$, $df = 1/4$, $p < .01$). Hypothesis one was supported. The motion vector-target vector correlated .77. In the negative induction group, the motion vector-negative induction resultant vector correlated .20 (n.s.). Hypothesis one was rejected. The negative induction motion vector-target vector correlated .24.

In the positive induction group, the Bayh motion vector-Humphrey motion vector correlated .64 ($F = 2.70$, $df = 1/4$, n.s.). Hypothesis two was

rejected. In the negative induction group, the Bayh motion vector-Humphrey motion vector correlated -.86 ($F = 11.16$, $df = 1/4$, $p < .05$). Hypothesis three was supported.

A one-way ANOVA was computed across the attitude change scores for the four groups. A significant F-ratio ($F = 4.17$, $df = 3/177$, $p < .01$) indicated that the amount of obtained attitude change varied across the groups. Three contrasts were computed: control-negative, negative-positive and control-positive. Only the contrast between the control group and the positive induction group was significant (Schefeé $T = 2.93$, critical value = 2.79, $p < .05$). The positive induction message evidently lead to more attitude change but the negative induction message did not decrease the amount of attitude change.

In the multiple discriminant analysis of the semantic differential data, one significant function was extracted defined by "competent," "experienced," "just" and "reliable" (Wilks' lambda = .74, $X^2 = 53.98$, $df = 12$, $p < .01$). Since the within covariance matrices were unequal ($X^2 = 96.75$, $df = 63$, $p < .01$), quadratic classification was employed. Seventy-three percent of the positive induction group, but only forty percent of the negative induction group, were correctly classified. The positive induction message produced greater effects than the negative induction message.

DISCUSSION

The results provide evidence that the majority of the variance in the assumed ratio judgments of dissimilarity is reliable in a small number of dimensions. The fact that the analysis of the unidimensional scales provided similar results to the metric (i.e., GALILEO) data indicates that the multidimensional attitude change model is not an unrealistic representation of cognitive change. However, the message effectiveness correlational

analysis provided mixed support for the hypotheses of the direction of cognitive change. The first hypothesis was supported in two of the four tests, hypothesis two was rejected and hypothesis three was supported. Thus, there are instances in which the motion of the manipulated concept is predictable in terms of the message components. However, several of the results are not explained by the model and need some explanation.

First, the positive and negative induction messages were comparable in Study I, yet hypothesis one was not supported in the positive induction condition. The differences in the effectiveness of the messages can be explained by adopting an additional message variable of "information redundancy." If the procedure of adding concepts together in the configuration to form messages adds concepts that are highly intercorrelated, then the message contains highly redundant information. After the public figure was centered at the centroid of the configuration, "incompetent" and "inexperienced" correlated .68 and "competent" and "experienced" correlated .19. The message higher in information redundancy produced greater effects while the message lowest in information redundancy produced a motion not predicted in terms of the message components. Since research supports the notion that greater information redundancy corresponds to greater information retention and greater confidence in information integration (Manis and Platt, 1975), future research on the multidimensional model should focus on the operation of this variable.

Some explanation must be given for the differential effects of the dissociative and associative linkages constructed in Study II. In the negative induction condition, Bayh moved almost orthogonally to the four-concept resultant vector and almost orthogonally to the target concept. Since the negative induction motion vector correlated poorly with the

trait descriptors, it is doubtful that the results could be explained in terms of differences in redundancy. Further, the message used in Study II did not vary as much in redundancy as the messages used in Study I. The average correlation between experimental concepts was .56 for the positive message and .39 for the negative message.

The results can be explained if one assumption is permitted. Since the two public figures were both liberal Senators, etc., it is possible that the subjects initially perceived some relationships between the two figures. If this is true, then the associative linkage would not constitute new information and produce little convergence in the motions. Instead, Bayh moved in relation to the resultant vector (hypothesis one). Alternatively, a message which dissociated the two public figures would constitute new information and produce strong effects. Thus, in the negative induction condition, hypothesis three was supported and since the public figures' locations diverged, Bayh did not move according to the resultant vector.

By way of interpreting the public figure's motions, we note that Tannenbaum's (1966; 1968) principal of mediated generalization predicts that both induction messages would increase Humphrey's credibility.[5] Humphrey moved towards experienced (r = .79) and competent (r = .63) due to the positive message and moved towards competent (r = .64) and experienced (r = .50) due to the negative message. While not significant, the correlations indicate that Humphrey's image did increase in a positive direction. However, Bayh did not move towards any concept due to the negative message (r = .36 for "inexperienced") and most of the motions of the public figures occurred on the fourth thru sixth dimensions (compare Tables 5 and 8). Thus, a clear interpretation of the effects of the positive message is available, but the interpretation of the effects of the negative message is ambiguous, despite the fact the

motions correlated -.86. The divergence in the locations may represent a divergence on a "liberal" criteria, but additional analyses must be conducted in order to provide a substantive interpretation of the motions.

The results of two studies suggest that the direction of cognitive change is predictable given two scope conditions. First, the direction of change is not predictable when a message contains a low level of information redundancy. Second, different hypotheses were supported when concepts were initially linked in some psychological fashion. The latter limitation is one stipulated in other, related, models of attitude change (Tannenbaum, 1966; 1968). While the motions were cross-validated with the use of semantic differential data, the messages did not alter the public figures' level of persuasibility. Granted, the positive induction message did increase Bayh's level of persuasibility in Study II, but this effect was not replicated in any other condition. These results raise the question as to whether or not any of the multidimensional scaling studies which employed a single message affected behavioral changes (Craig, 1977; Woelfel et al., 1979). Future research on multidimensional scaling model should benefit from the present study in three ways. First, in selecting a message strategy, one should not rely only on the quality of the target vector-resultant vector correlation, but should also focus on the level of information redundancy contained in the potential messages. Second, future research should identify the exact nature of how concepts which are initially linked are associated in order to (a) predict on an a priori basis the effects of messages and (b) provide a substantive interpretation of message effects. Finally, future research should utilize message criteria of redundancy, amount of distance advocated or employ message repetition in order to investigate how much perceptual change is necessary in order to influence behaviors.

NOTES

1. Dr. J. Woelfel, March 1979, personal correspondence.

2. Data in Study II were originally presented in Cody, Marlier and Woelfel (1976). At the time the paper was presented, the message effectiveness analysis procedures had not been developed. Data for both studies were collected in 1976, prior to Hubert Humphrey's sickness and death. Three dimensional plots for the two studies can be obtained by writing to Dr. Cody, Box 4209, Texas Tech, Lubbock, TX. 79409.

3. With six dimensions, there are 1 and 4 degrees of freedom for the significance tests for correlations. If six reliable dimensions represent a closed system within which cognitive change occurs, then all of the variance in the motion vector must be accounted for in a few dimensions. With few degrees of freedom, correlations must be very high in order to achieve significance. Therefore, the message effectiveness analysis provides a very stringent test for hypothesized motions.

4. Discriminant analysis was selected over the more general multivariate analysis of variance procedure for two reasons: (1) discriminant analysis and MANOVA yield identical results; and, (2) discriminant analysis indicates whether there exists several mutually exclusive dimensions of differences among the groups (see McLaughlin, 1979).

5. That is, a message which describes two public figures as similar and attributes qualities of x, y and z to one public figure will result in moving the second public figure to the locations of x, y and z. Similarly, a message which dissociates the two public figures and describes one public figure as not possessing qualities x, y and z will result in moving the second public figure towards the locations of x, y and z.

TABLE 1

Correlations of coordinate loadings of stable concepts of respective dimensions across control group-experimental group configurations

Dimensions:	Comparisons:				
	Control-Positive Study I	Control-Negative Study I	Control-Speech Only Study II	Control-Positive Study II	Control-Negative Study II
1	.99	.99	.99	.99	.99
2	.80	.79	.98	.97	.97
3	.93	.80	.98	.89	.84
4	.59	.60	.95	.70	.93
5	.91	.90	.99	.77	.92
6	.85	.85	.91	.60	.96
7	.02	.40	.94	.11	-.41
8	.23	.31	.95	.92	.85
9	-.07	.74	.92	.80	.17
10*	.08	.49	.89	.86	.82
11**	-.77	-.40	.09	-.03	-.54
12	.90	.64	.24	.80	.77
13	.29	.94	.26	.97	.90
14	.93	.95	.63	.96	.94
15	.93	.96	-.86	.93	.93
16	.92	.94	.83	.99	.98

* Denotes "rounding error" dimension.

** Dimension 11 and all remaining dimensions are "imaginary."

TABLE 2

Control Group Coordinates--Stable Concepts Rotation (Study I)

Concepts	Dimensions					
	1	2	3	4	5	6
1. Competent	33.50	-19.33	5.88	10.81	-19.29	5.28
2. Inexperienced	-33.13	-20.32	31.44	-19.45	12.63	6.20
3. Richardson	14.16	8.55	-2.81	-7.57	-9.08	-3.00
4. Repulsive	-27.62	-13.36	-5.11	6.04	-11.09	-20.69
5. Unintelligent	-42.52	15.27	13.89	26.97	10.42	-3.01
6. Just	29.24	-.97	20.64	-7.34	6.96	-19.47
7. Reliable	33.90	1.74	25.31	13.76	3.64	9.09
8. Unreliable	-41.09	-3.65	-19.49	-11.37	1.78	-10.32
9. Informed	28.65	-16.77	-14.48	9.60	29.91	3.65
10. Unjust	-35.66	-15.64	-19.69	15.23	-2.00	23.56
11. Intelligent	34.01	-12.51	-16.24	-26.46	-6.73	6.50
12. Ideal Credible Source	45.49	.47	-.78	-.61	-3.46	-1.73
13. Attractive	15.57	43.98	-6.96	-13.01	12.19	11.09
14. Incompetent	-38.85	4.24	-10.96	-7.63	11.80	-7.16
15. Experienced	24.66	13.85	-14.93	19.11	-11.04	-9.99
16. Uninformed	-40.33	14.43	14.30	-8.08	-26.66	9.99
Eigenvalues:	17992.71	4325.17	4155.63	3373.08	2988.31	2069.27
Percent variance:	48.28	11.60	11.15	9.05	8.02	5.55

TABLE 3

Positive Induction Coordinates--Stable Concepts Rotation (Study I)

Concepts	Dimensions					
	1	2	3	4	5	6
1. Competent	38.85	-11.64	11.23	17.84	-21.60	9.94
2. Inexperienced	-37.54	-7.70	29.74	-10.47	16.01	2.18
3. Richardson	35.46	6.90	-9.69	7.12	-6.66	-2.90
4. Repulsive	-28.71	-33.17	-1.50	-6.09	-15.65	-4.67
5. Unintelligent	-43.61	2.97	5.65	13.62	13.24	-6.27
6. Just	25.15	-1.19	16.73	4.13	7.12	-24.73
7. Reliable	27.41	2.11	19.41	-7.90	5.95	17.45
8. Unreliable	-41.85	2.56	-16.27	13.37	-7.69	-18.20
9. Informed	29.46	-26.19	-12.59	6.29	21.16	-1.46
10. Unjust	-32.63	-5.35	-7.70	5.34	-13.16	29.85
11. Intelligent	32.30	-.81	-5.14	-18.45	-9.47	.21
12. Ideal Credible Source	41.01	7.23	5.82	-8.71	4.70	1.05
13. Attractive	13.75	32.13	-8.68	-4.49	19.55	3.64
14. Incompetent	-46.00	1.12	-15.17	-17.75	20.44	-5.62
15. Experienced	31.24	3.03	-22.46	7.96	-12.78	-4.87
16. Uninformed	-44.31	27.97	10.62	-1.83	-21.15	4.39
Eigenvalues:	19975.17	4526.95	3861.93	3480.42	2375.76	2319.05
Percent variance	51.97	11.78	10.05	9.05	6.18	6.03

TABLE 4

Negative Induction Coordinates--Stable Concepts Rotation (Study I)

Concepts	Dimensions					
	1	2	3	4	5	6
1. Competent	42.48	-13.17	-1.72	.92	-30.12	20.76
2. Inexperienced	-32.40	-19.64	31.85	-10.91	19.74	11.62
3. Richardson	-25.46	7.14	7.37	19.47	9.35	-.89
4. Repulsive	-30.55	-13.43	-14.12	7.12	-16.06	-12.31
5. Unintelligent	-43.94	-10.04	-6.06	.73	3.45	-17.11
6. Just	32.29	-5.84	25.89	-3.19	1.21	-26.83
7. Reliable	37.63	-8.84	9.88	2.24	-.85	6.81
8. Unreliable	-41.92	-.53	-9.03	-2.71	1.15	-9.58
9. Informed	37.98	-25.46	-21.92	-2.87	21.84	-3.59
10. Unjust	-31.88	-.42	-25.46	2.11	-7.26	34.36
11. Intelligent	37.23	4.15	1.11	-1.39	5.73	11.44
12. Ideal Credible Source	58.54	6.54	8.93	.20	-1.71	6.26
13. Attractive	24.40	34.74	2.46	-17.94	22.81	-.30
14. Incompetent	-52.47	14.73	-1.18	-2.04	17.91	-15.91
15. Experienced	34.35	10.68	-27.62	10.84	-19.66	-12.84
16. Uninformed	146.27	19.41	19.62	-2.59	-27.53	8.13
Eigenvalues:	24694.26	5880.57	5386.00	4252.34	3894.18	3589.46
Percent variance:	48.06	11.44	10.48	8.28	7.58	6.99

TABLE 5

Control Group Coordinates--Stable Concepts Rotation (Study II)

Concepts	Dimensions 1	2	3	4	5	6
1. Competent	46.14	-24.76	-29.46	-.83	13.73	14.55
2. Inexperienced	-43.76	39.29	-15.31	-27.35	19.23	.40
3. Birch Bayh	-1.86	6.11	-.16	1.16	1.18	-23.41
4. Repulsive	-47.41	-20.30	-22.01	-24.45	-9.53	4.91
5. Unintelligent	-53.04	14.99	-27.19	37.14	-16.97	7.01
6. Just	43.52	30.24	-9.08	-15.57	-27.69	12.74
7. Reliable	44.21	12.99	-32.44	11.16	10.14	-17.47
8. Unreliable	-51.44	-17.80	31.52	-6.00	-9.75	18.94
9. Hubert Humphrey	11.12	-19.57	-2.42	-17.72	-27.32	-16.52
10. Unjust	-47.61	-35.85	-1.51	15.24	31.35	-8.57
11. Intelligent	36.60	-13.01	21.69	-36.51	14.39	-8.95
12. Ideal Credible Source	64.56	4.34	8.85	.98	-4.10	-2.37
13. Attractive	25.97	30.74	41.17	24.49	14.57	-.79
14. Incompetent	-59.18	13.40	23.53	-1.43	-15.05	-15.57
15. Experienced	41.43	-34.28	10.20	22.57	-21.30	-4.83
16. George McGovern	18.39	-.12	8.24	.95	9.03	35.26
Eigenvalues:	29737.76	8389.50	7432.16	6124.95	4825.70	3601.19
Percent variance:	45.23	12.76	11.30	9.32	7.34	5.48

TABLE 6

Speech Only Group Coordinates--Stable Concepts Rotation (Study II)

Concepts	Dimensions 1	2	3	4	5	6
1. Competent	56.02	-20.32	-27.52	-13.30	13.90	17.32
2. Inexperienced	-42.78	40.60	-6.90	-25.68	20.71	3.71
3. Birch Bayh	10.52	3.24	1.76	-2.56	15.46	1.18
4. Repulsive	-44.11	-15.75	-26.84	-15.41	-13.05	-10.15
5. Unintelligent	-51.16	8.49	-18.68	38.77	-15.26	14.08
6. Just	40.80	34.41	-4.45	-11.94	-31.05	12.40
7. Reliable	47.48	13.52	-27.93	5.71	12.38	-19.80
8. Unreliable	-54.24	-13.53	24.08	-11.42	-10.88	22.83
9. Hubert Humphrey	10.81	-18.54	8.56	-21.15	-16.64	-21.07
10. Unjust	-49.54	-34.51	-1.76	17.79	30.67	-4.76
11. Intelligent	36.62	-13.80	18.85	-32.77	19.62	-8.13
12. Ideal Credible Source	63.03	2.93	7.44	-2.90	-3.77	.74
13. Attractive	16.94	21.47	39.14	35.34	11.33	-5.28
14. Incompetent	-60.60	15.88	20.39	1.16	-14.15	-16.19
15. Experienced	39.54	-39.40	4.20	14.65	-20.44	-6.77
16. George McGovern	3.47	2.54	8.81	-16.93	-8.90	22.37
Eigenvalues:	30390.01	8095.13	6927.45	6109.52	5058.06	4569.23
Percent variance:	43.35	11.55	9.88	8.72	7.22	6.52

TABLE 7

Positive Induction Coordinates--Stable Concepts Rotation (Study II)

Concepts	Dimensions 1	2	3	4	5	6
1. Competent	57.94	-14.56	-28.10	8.28	7.04	10.49
2. Inexperienced	-45.44	40.35	-22.48	-20.81	7.18	15.47
3. Birch Bayh	27.88	-2.81	.89	10.09	-.20	8.58
4. Repulsive	-49.65	-33.62	-30.33	-3.02	-22.12	-2.74
5. Unintelligent	-57.43	18.64	-4.94	34.50	4.77	-24.96
6. Just	39.89	35.40	-12.13	19.74	-28.97	9.56
7. Reliable	43.66	14.85	-21.47	-.26	14.44	-28.88
8. Unreliable	-57.25	-12.68	17.39	11.83	-9.23	32.74
9. Hubert Humphrey	35.24	-13.95	14.11	15.60	-2.47	14.10
10. Unjust	-45.11	-36.08	8.40	-15.32	33.27	-17.44
11. Intelligent	42.22	-17.68	2.17	-33.70	-.92	19.57
12. Ideal Credible Source	65.42	2.57	5.08	-11.22	5.76	-.48
13. Attractive	23.86	26.80	49.39	-1.90	9.83	-1.21
14. Incompetent	-63.93	12.54	22.22	-3.72	-13.99	1.62
15. Experienced	45.82	-36.54	14.78	15.62	-7.08	-13.73
16. George McGovern	16.38	4.69	1.93	-6.59	8.96	26.40
Eigenvalues:	35265.89	9331.64	6840.32	5757.51	5293.54	3773.15
Percent variance:	48.45	12.82	9.40	7.91	7.27	5.18

TABLE 8

Negative Induction Coordinates--Stable Concepts Rotation (Study II)

Concepts	Dimensions 1	2	3	4	5	6
1. Competent	55.27	-13.45	-33.22	-4.29	1.53	13.31
2. Inexperienced	-48.76	43.56	-24.91	-16.88	17.41	-4.05
3. Birch Bayh	-8.08	-1.16	7.46	-37.84	-6.71	-18.17
4. Repulsive	-43.24	-21.72	-24.69	-15.30	-13.72	3.66
5. Unintelligent	-52.95	14.61	2.30	23.42	-25.40	13.01
6. Just	39.99	32.64	-6.53	-1.20	-31.26	3.80
7. Reliable	45.84	21.03	-17.38	9.76	9.75	-12.65
8. Unreliable	-55.96	-17.27	14.88	-4.29	-6.55	19.24
9. Hubert Humphrey	19.82	-18.79	-21.26	26.00	-1.18	-8.82
10. Unjust	-44.00	-37.27	2.82	2.30	26.82	-8.77
11. Intelligent	39.98	-13.03	.22	-18.39	23.52	-3.89
12. Ideal Credible Source	55.22	5.90	-2.30	-8.29	3.16	-3.27
13. Attractive	22.04	17.82	49.82	9.25	17.59	4.45
14. Incompetent	-60.11	8.41	23.91	6.57	-5.41	-21.47
15. Experienced	46.68	-41.23	15.08	17.36	-17.43	-3.38
16. George McGovern	12.43	-2.64	-2.35	1.60	13.42	30.93
Eigenvalues:	30610.95	8835.02	6765.08	6075.79	5085.38	3689.35
Percent variance:	43.37	12.52	9.58	8.61	7.20	5.23

References

Barnett, G. Reliability and metric multidimensional scaling. Unpublished research report, Department of Communication, Michigan State University, 1972.

Barnett, G., Serota, K. and Taylor, J. A Method for political communication research. Paper presented to the Association for Education in Journalism, San Diego, California, August, 1974.

Barnett, G., Serota, K. and Taylor, J. Campaign communication and attitude change: A multidimensional analysis, Human Communication Research, 1976, 2, 227-244.

Campbell, D. and Stanley, J. Experimental and quasi-experimental designs for research, Chicago, Illinois: Rand McNally, 1966.

Cliff, N. Orthogonal rotation to congruence, Psychometrika, 1966, 31, 32-42.

Cody, M.J. An application of the multiple attribute measurement model: measurement and manipulation of source credibility. Unpublished master's thesis, Department of Communication, Michigan State University, 1976.

Cody, M.J. Applications of the multiple attribute measurement model: Two studies. Unpublished manscript, Department of Communication, Michigan State University, E. Lansing, Michigan, 1977.

Cody, M.J. and Marlier, J. Theoretical criteria for stable concepts rotation. Unpulbished manscript, Department of Communication, Michigan State University, E. Lansing, Michigan, 1977.

Cody, M.J., Marlier, J. and Woelfel, J. A reconceptualization of multiple attribute measurement: The location of unidimensional scales in an n-dimensional space. Paper presented to the Math Psychology Meetings, Purdue University, W. Lafayette, Indiana, August, 1975.

Cody, M.J., Marlier, J. and Woelfel, J. An application of the multiple attribute measurement model: Measurement and manipulation of source credibility. Paper presented to the International Communication Association, Portland, Oregon, April, 1976.

Craig, R. Limiting the scope of the spacial model of communication effects, Human Communication Research, 1977, 3, 309-325.

Danes, J.E. Communication models of the message-belief change process. In B.D. Ruben, Ed., Communication Yearbook II, New Brunswick: New Jersey: Transaction Press, 1978, 109-124.

Danes, J.E., Hunter, J.E. and Woelfel, J. Mass communication and belief change: A test of three mathematical models. Human Communication Research, 1978, 4, 243-252.

Gillham, J. and Woelfel, J. The galileo system of measurement: preliminary evidence for precision, stability and equivalence to traditional measures. Human Communication Research, 1977, 3, 222-234.

Gordon, T.F. and DeLeo, H.C. Structural variation in "galileo" space: effects of varying the criterion pair in metric multidimensional scaling. Unpublished manuscript, Temple University, Philadelphia, 1975.

Heston, J. Ideal Source Credibility: A re-examination of the semantic differential. Paper presented to the International Communication Association, Montreal, Canada, April, 1973.

Hovland, C., Janis, F. and Kelley, H. Communication and Persuasion, New Haven, Conn.: Yale University Press, 1953.

Korzenny, F., Ruiz, M. and David, A. Metric multidimensional scaling and automatic message generation applied to the tourism industry. Paper presented to the International Communication Association, Chicago, Illinois, April, 1978.

McCrosky, J., Jensen, T. and Todd, C. The generalizability of source credibility scales for public figures. Paper presented to the Speech Communication Association, Chicago, Illinois, December, 1972.

McLaughlin, M.L. Recovering the structure of credibility judgments. An alternative to factor analysis, Speech Monographs, 1975, 42, 221-228.

McLaughlin, M.L. Discriminant analysis. In P. Monge and J. Cappella (Eds.), Multivariate Analysis in Communication Research, forthcoming.

McLaughlin, M.L. and Erickson, K.V. Behavioral correlates of perceived teacher effectiveness. Paper presented to the Western Speech Communication Association, Phoenix, 1977.

Manis, M. and Platt, M.B. Integrating verbal information: The referential-communication paradigm, in M.F. Kaplan and S. Schwartz, (Eds.),

Human Judgment and Decision Processes, New York: Academic Press, 1975, p. 173-197.

Mills, J. and Aronson, E. Opinion change as a function of communicator's attractiveness and desire to influence, Journal of Personality and Social Psychology, 1965, 1, 173-177.

Saltiel, J. and Woelfel, J. Inertia in cognitive processes: The role of accumulated information in attitude change. Human Communication Research, 1975, 1, 333-344.

Schneider, D.J. Implicit personality theory: A review. Psychological Bulletin, 1973, 79, 294-309.

Schonemann, P. A generalized solution of the orthogonal Procrustes problem, Psychometrika, 1966, 31, 1-10.

Scott, W.A. Structure of natural cognitions, Journal of Personality and Social Psychology, 1969, 6, 294-309.

Serota, K., Cody, M.J., Barnett, G. and Taylor, J. Precise procedures for optimizing campaign communication, in B.D. Ruben, (Ed.), Communication Yearbook I, New Brunswick, N.J.: Transaction Press, 1977, 475-491.

Tannenbaum, P. Mediated generalization of attitude change via the principle of congruity, Journal of Personality and Social Psychology, 1966, 3, 493-499.

Tannenbaum, P. The congruity principle: Retrospective reflections and recent research. In R.P. Abelson et al. (Eds.), Theories of Cognitive

Consistency: A Sourcebook. Chicago, Illinois: Rand McNally, 1968, 52-72.

Walters, H. and Jackson, D. Group and individual regularities in trait inference: A multidimensional scaling analysis, Multivariate Behavioral Research, 1966, 1, 145-163.

Woelfel, J. Metric measurement of cultural processes. Paper presented to the Speech Communication Association, Chicago, 1974.

Woelfel, J., Cody, M., Gillham, J. and Holmes, R. Basic premises of multidimensional attitude change theory -- an experimental analysis. Human Communication Research, in press.

Woelfel, J., and Danes, J.E. New techniques for the multidimensional analysis of communication and conception. In P. Monge and J. Cappella (Eds.), Multivariate Analysis in Communication Research, forthcoming.

Woelfel, J., Fink, E., Holmes, R., Cody, M.J. and Taylor, J. A mathematical procedure for optimizing political campaign strategy. Paper presented to the International Communication Association, Portland, Oregon, April, 1976.

Woelfel, J., Holmes, R., Cody, M.J., and Fink, E. A multidimensional scaling based procedure for designing persuasive messages and measuring their effects. Paper presented at the Mathematical Psychology meetings. Chapel Hill, N. Carolina, July, 1977.

Woelfel, J., and Saltiel, J. Cognitive processes as motions in a multi-

dimensional space. Unpublished manuscript, Department of Communication, Michigan University, 1975.

Woelfel, J., Saltiel, J., McPhee, R., Danes, J., Cody, M.J., Serota, K., and Barnett, G. Orthogonal rotation to theoretical criteria: comparison of multidimensional spaces. Paper presented at the annual meeting of the Mathematical Psychology Association, Purdue, Indian, 1975.