A STUDY OF PRIOR COMMITMENT, DISSONANCE, AND ATTITUDE CHANGE

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This is to certify that the

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ABSTRACT

A STUDY OF PRIOR COMMITMENT, DISSONANCE, AND ATTITUDE CHANGE

By

Richard Dean Carter

The Purpose of the Study

The purpose of this investigation was to determine if a change of attitude could be induced and explained by dissonance in subjects with high prior commitment about an issue. The primary questions considered in the study were:

1. Can a change of attitude be induced and explained by dissonance in subjects who have a high degree of prior commitment?
2. When engaging in an act which is discrepant with one's private beliefs, does a high commitment situation (proposed-televised-publicly identified use of statements) or a low commitment situation (proposed-anonymous-non video recorded use of statements) result in the subject's experiencing a greater change of attitude?
3. Does more or less verbal justification for subjects engaging in a discrepant behavior result in greater attitude changes?

Procedures Followed in the Study

A review of related literature was made which led to the conclusion that dissonance theory and the theory related to the social judgment-involvement approach to attitude change would be of particular importance in interpreting the results of this study. The literature revealed that these two major theories could lead to contrasting expectations concerning the results of the study.

The subjects were 145 students at Wisconsin State University-Superior. The University, just prior to the beginning of the 1969-70 school year, had to implement a dramatic increase in non-resident tuition and fees. Although evidence led to the conclusion that most students had strong feelings in opposition to the tuition and fee increase, non-resident and resident students were respectively designated as having either high prior commitment or low prior commitment about the issue.

All the subjects, having been designated as having either high prior commitment or low prior commitment, were assigned either to one of the experimental groups which performed a belief discrepant behavior or to a control group where no belief discrepant behavior was performed. The experimental and control group subjects were placed in a high commitment situation (proposed-televised-publicly identified use of the statements) or in a low commitment situation (proposed-anonymous-non video recorded use of the statements). The subjects in the experimental groups were given one or two levels of verbal justification for participating in the belief discrepant behavior. Subjects in the control situations were given one level of justification. A semantic differential was used as the pre-test and post-test measure. Both a

multivariate analysis of covariance and a univariate analysis were used in analyzing the data. The basic design of the study was a 2 x 3 x 2 factorial design.

Findings and Conclusions of the Study

Significance tests were made on:

1. low prior commitment vs high prior commitment
2. low justification vs control and high justification vs control
3. low commitment vs high commitment
4. prior commitment x justification interaction
5. prior commitment x commitment interaction
6. justification x commitment interaction
7. prior commitment x justification x commitment interaction

The multivariate analysis of covariance did not yield any statistically significant results. The univariate analysis produced some statistically significant results, but not in any consistent manner. On the basis of the statistical evidence accumulated, none of the three null hypotheses related to the investigation could be rejected.

The failure of the data to support the first hypothesis of this investigation, which was related to the ability of dissonance to induce and explain a change of attitude in subjects with a high degree of prior commitment, in large confirms the findings of social judgment-involvement approach researchers. Social judgment-involvement theorists predict that with great discrepancy between one's own position and that advocated in a contrary communication or role, little or no change of attitude will occur. However, a speculative explanation

for the failure of the data to warrant rejection of the first null hypothesis can be found in dissonance theory. As dissonance can be reduced by means other than a change of attitude, it can be suggested that an alternate form of dissonance reduction was chosen by the subjects. A review of some of the experimental subjects' speech outlines indicated that some subjects did reduce dissonance by slanting their outlines in such a manner as to reduce their dissonant situation.

Since no main effects or clear interaction effects related to either commitment or justification were found, the second and third null hypotheses of this investigation were not rejected.

No generalizations related to the hypotheses appear valid from this investigation. Although the data does support the position taken by social judgment-involvement theorists, alternative dissonance explanations are plausible and further research is suggested.

Implications for Further Research

On the basis of the limitations and conclusions of this study, research in the following specific areas is warranted:

1. A further investigation, with appropriate controls for alternate modes of dissonance reduction, to determine if dissonance can induce and can explain attitude change in subjects with what has been labeled as a high degree of prior commitment in this study.
2. An investigation to determine the nature of verbal justification as perceived by the experimental subject.
3. A thorough study of the impact of role playing on producing long term changes of attitude.

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By

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CHAPTER I

INTRODUCTION

It has been demonstrated that private opinion may be changed when an individual finds it necessary to express a public position contrary to his private attitudes. The reasons for involvement in situations of such discrepant nature vary widely. The effect such situations have on one's commitment to behavioral actions is important to this investigation.

There are several theoretical positions which attempt to explain the degree of attitude change that can reasonably be expected when an individual finds himself in a position of expressing public opinions contrary to his private attitudes. Sherif's social judgment-involvement approach and Festinger's theory of cognitive dissonance are two of the major theories related to this problem. These two theories lead to different predictions concerning the potential attitude change. As McGuire indicated, a degree of theoretical controversy centers around the discrepancy-involvement question.[1] This investigation will attempt, in part, to extend the research related to the discrepancy-involvement question in the study of the change of attitudes.

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[1]William J. McGuire, "The Current Status of Cognitive Consistency Theories," in Shel Feldman (ed.) Cognitive Consistency: Motivational Antecedents and Behavioral Consequents (New York: Academic Press, 1966), p. 19.

I. Statement of the Problem

The purpose of this investigation was to study if a change of attitude could be induced and explained by dissonance in subjects with high prior commitment about an issue. The primary questions considered in the study were:

1. Can a change of attitude be induced and explained by dissonance in subjects who have a high degree of prior commitment?
2. When engaging in an act which is discrepant with one's private beliefs, does a high commitment situation (proposed-televised-publicly identified use of statements) or a low commitment situation (proposed-anonymous-non video recorded use of statements) result in the subjects having a greater change of attitude?
3. Does more or less verbal justification for subjects engaging in a discrepant behavior result in greater attitude change?

II. Need for the Study

A number of recent studies differentially lend support to two of the theories related to the study of attitude change. Both approaches, most commonly associated with the theories of Festinger and Sherif, evaluated what takes place when the individual confronts or creates a communication discrepant with his own attitudes. Festinger's theory of dissonance predicted that the larger the discrepancy between a person'a private position and a discrepant communication or action, the greater will be the resulting attitude change. To the contrary, Sherif's

social judgment-involvement approach predicted that when small discrepancies exist a change of attitude may occur, but large discrepancies with one's private position will result in little or no attitude change.[1]

Involvement of subjects with an issue is viewed differently in the two theories. Sherif indicated that apparent contradictions between the social judgment-involvement approach and dissonance theory are in part explained by the failure of dissonance theorists to consider the involvement of subjects in the issue. As Rand indicated, the concept most related to involvement in dissonance theory is how important the issue is to the individual.[2] The social judgment-involvement approach leads the investigator to expect less attitude change with the greater involvement of the subjects. On the other hand, dissonance theory leads the investigator to conclude greater change is more probable as the importance of the issue to the individual increases. These apparent contradictions indicated a need for further exploration of the effect of discrepant communication or discrepant action on the change of individual attitudes. The need for further exploration concerning individual involvement and attitude change is also evident. This investigation is, in part, an attempt to meet this need for further research.

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[1]Melvin A. Rand, "An Empirical Comparison of Sherif's Social Judgment Approach and Festinger's Dissonance Theory at Their Points of Contrast Ego Involvement and Discrepancy of Communication," (unpublished Doctoral dissertation, University of Oklahoma, 1967), Dissertation Abstracts, 1967, 29 A. 1: 1128-1129-A.

[2]loc. cit.

III. Theory and Definition of Basic Terms

The basic background of the theory of cognitive dissonance consists of the idea that the human organism tries to establish internal harmony or consistency among his opinions, attitudes, knowledge, and values.[1] The term cognition refers to any knowledge, opinion, or belief about the environment, one's self, or one's behavior.[2] Dissonance is used to represent inconsistency between cognitive elements. Two cognitive elements are dissonant if they do not agree or if, for one reason or another, they do not fit together.[3] For example, if a person knew he could only afford to pay $250 for a new home appliance and he had just been persuaded to sign a contract for an appliance costing $400, there would be a dissonant relation between these two cognitive elements. To the contrary, two cognitive elements are consonant if one follows from the other. Thus, the knowledge that it is twenty degrees below zero is consonant with a chilled feeling when you leave the house to go outside.

Consonance and dissonance may exist only between relevant elements; therefore, if the elements are not related, there is no basis for dissonance.[4] The degree of dissonance is determined by the proportion of all relevant cognitive elements that are dissonant. Secord and Backman explained:

> The magnitude of dissonance is a function of the proportion of all relevant cognitive elements that is dissonant. These elements

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[1] Leon Festinger, A Theory of Cognitive Dissonance (Stanford, California: Stanford University Press, 1957), p. 260.

[2] Ibid., p. 3.

[3] Ibid., p. 12.

[4] Ibid., pp. 11-13.

are generally weighted according to their importance. Thus, the magnitude of dissonance may be expressed in terms of the following ratio:

$$\text{Dissonance} = \frac{\text{importance X no. of dissonant elements}}{\text{importance X no. of consonant elements}}$$

From this ratio it is clear that the more nearly equal the relative proportions of consonant and dissonant elements, the greater the dissonance is. If there are only a few dissonant elements and many consonant elements, dissonance is relatively low. The number of dissonant elements can never exceed the number of consonant elements, for this would lead to a change, removing the dissonance.[1]

The ratio is used to explain the concept and is not intended as a measuring device.[2] However, the magnitude of dissonance created can also be viewed as the magnitude of consequent attitude change.[3] According to Festinger, behavior change is an attempt to reduce dissonance. The strength of the psychological pressure to change behavior is a function of the magnitude of dissonance.[4]

There are some interesting implications of dissonance theory that are of special importance to this investigation. First, the more important the belief is to the individual, the greater will be the magnitude of dissonance if the individual is led to engage in a behavior discrepant with that belief. Secondly, whenever a person's cognitions about external forces lead to a public stand different from the privately held attitude, dissonance will result.[5] Following the logic

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[1]Paul F. Secord and Carl W. Backman, Social Psychology (New York: McGraw-Hill Book Company, 1964), p. 116.

[2]Ibid., p. 116.

[3]Arthur R. Cohen, "Attitudinal Consequences of Induced Discrepancies Between Cognitions and Behavior," Public Opinion Quarterly 1960, 24: 297.

[4]Festinger, op. cit., p. 18.

[5]Cohen, op. cit., pp. 297-298.

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of the theory, increasing the justification for taking a public position contrary to one's private attitude will reduce the magnitude of dissonance and corresponding attitude change. That is to say, the minimal justification that will elicit the dissonant behavior will result in the largest magnitude of dissonance and the greatest change. The logic of the theory further indicates that in forced compliance situations, such as this investigation, the least justification that will elicit the behavior contrary to one's attitude will result in the greatest change of attitude.[1]

There are some theoretical differences between the theory of cognitive dissonance and the social judgment-involvement approach to attitude and attitude change which relate to this investigation. The theory of the social judgment-involvement approach will be reviewed primarily at the points of contrast with dissonance theory. It can be postulated from the social judgment-involvement approach that if a subject is highly involved with his position, a large discrepancy between his personal stand and a communication or public action will rarely result in a change of attitude. Sherif and Hovland stated:

> With small discrepancies between the position of communication and that of the subject, changes of opinion in the direction advocated by communication will occur. With large distances between the stands taken in communication and by the subject, opinion changes will be infrequent. Changes in the direction opposite to that advocated by communication will be more frequent when the discrepancy between the stands taken in communication and by the subject is large.[2]

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[1] Festinger, op. cit., pp. 260-263.

[2] Muzafer Sherif and Carl I. Hovland, Social Judgment: Assimilation and Contrast Effects in Communication and Attitude Change (New Haven: Yale University Press, 1961), p. 157.

An individual's stand is conceived as an internal anchor in the social judgment-involvement approach. Any discrepancy between the individual's stand and a particular communication is considered a relative difference to be defined by an internal reference scale for rejection, acceptance, and noncommitment. Ego involvement is considered to be of prime importance in understanding the reference scales of the individual. An assimilation range is also a part of the social judgment-involvement approach to attitude change. This range refers to the individual's latitude of acceptance of positions which are not highly objectional to him. This is to say that the less the individual is involved in his stand, the greater will be his assimilation range.

The importance of the assimilation range and personal involvement in an issue to understanding the implications of the theory are illustrated by the following statement of Sherif, Sherif, and Nebergall:

> To sum up so far, there is now evidence that increased discrepancy between initial position and the communication does increase the likelihood of change up to a certain point and that this point is affected by the degree of involvement in own stand. When involvement is high, increasing discrepancies lead to unfavorable evaluation of the communication, contrasted placement of its position, and decreased tendency to change toward the communication, with boomerangs away from the position advocated when both discrepancy and ego involvement are very great.[1]

The social judgment-involvement approach and the theory of cognitive dissonance lead to different predictions related to the hypotheses of this investigation. The synopses of the two theories were presented from the standpoint of their potential to assist in the interpretation of the results of this investigation and should not be considered as a comprehensive review of either the social judgment-involvement approach or the theory of cognitive dissonance.

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[1]Carolyn W. Sherif, Muzafer Sherif, and Roger E. Nebergall, Attitude and Attitude Change: The Social Judgment-Involvement Approach (Philadelphia: W. B. Saunders Company, 1965), pp. 196-197.

IV. Organization of the Dissertation

The remainder of this dissertation has been divided into four chapters. Chapter II is concerned with a review of the literature pertinent to this investigation and is divided into four main areas:

1. A review of representative literature related to the theory of cognitive dissonance.
2. A review of representative literature related to the social judgment-involvement approach.
3. Contrasts in dissonance research and research related to the social judgment-involvement approach.
4. An overview of literature pertinent to this study.

Chapter III is devoted to the plan of procedure followed in this study. In the major sections of this chapter, consideration will be given to the description of the population, the experimental design, description of the measuring instrument, the hypothesis, statistical techniques for analysis of the data, and a chapter review. In Chapter IV an analysis of the data is presented. Chapter V is devoted to the summary and conclusions of the dissertation.

CHAPTER II

REVIEW OF RELATED LITERATURE

Much of the literature related to attitude change has emerged in the last two decades. Two of the major theories articulated in the past twenty years were Festinger's theory of cognitive dissonance and Sherif's social judgment-involvement approach (assimilation contrast theory), both of which are discussed in this chapter. In addition, literature related to the points of difference between these two theories will be reviewed.

I. Review of Representative Literature Related to the Theory of Cognitive Dissonance

In self persuasion experiments a common occurrence has been the change of attitudes by individuals. The theory of cognitive dissonance has frequently been used to explain this phenomenon. For example, it can be indicated that whenever an individual behaves in a manner discrepant with his private attitude, dissonance may result; one way to reduce the resultant dissonance is to change the attitude. Gross predictions about the degree of attitude change can be made on the basis of dissonance theory if consideration is given to the importance of the issue to the individual (prior commitment), commitment, and justification for engaging in the discrepant behavior.

The magnitude of dissonance increases as the importance of the opinion to the person increases.[1] Research by Cohen supported the

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[1]Festinger, op, cit., p. 263.

concept that prior commitment (importance of the opinion) will in part control the magnitude of dissonance:

> The amount of dissonance will increase as the general importance of the guiding cognitions increases, and as the balance between the opposing cognitions increases. When a person experiences dissonance, he will try to reduce or eliminate it in proportion to its strength. In general, he may do this by making his cognitions more consistent with the expression already made. Thus, one major consequence will be a change in one's private opinion to make it more consistent with the position expressed.[1]

The magnitude of dissonance is effected by the degree of commitment--public versus private commitment or identified versus anonymous statements. Normally we do not know if a commitment has been made unless it is public; however, it can be assumed that public commitment is usually more resistant to change than private commitment. A further assumption may be made: resistance to change will increase as the strength of expectation the individual will hold to the commitment increases.[2]

A 1968 study by Helmreich and Collins investigated implications of dissonance theory under three levels of commitment. These three levels of commitment were identified as anonymous audio recording, identified video recording with subsequent explanation, or identified video recording with no opportunity to recant. In the Helmreich-Collins study subjects were enticed to record a strongly counter attitudinal statement about an important issue. Subjects were paid either $.50 or $2.50 for the counter attitudinal task. In the two higher commitment conditions subjects given low financial inducement showed significantly more

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[1]Cohen, op. cit., p. 298.

[2]Jack W. Brehm and Arthur R. Cohen, Explorations in Cognitive Dissonance (New York: John Wiley and Sons, Inc., 1962), p. 8.

attitude change than those given the larger sum. In the low-commitment condition the larger amount of money produced more attitude change. The commitment effect was significant at the .05 level and according to the authors, in large, the study found dissonance effects on the commitment issue.[1]

The amount of justification like the degree of commitment plays an important part in predicting attitude change according to dissonance theorists. The effect of justification is illustrated in the Secord and Backman summary of the often-quoted 1959 experiment of Festinger and Carlsmith. In the Festinger and Carlsmith experiment subjects were told after the completion of a dull, boring experimental task that a student helper usually brought in the next experimental subject and told him how enjoyable the experiment was. It was implied the person who normally completed this function had not shown up. The subject who had just completed the dull and boring task was asked to fill in for the missing helper. Two degrees of reward (justification) for serving in this role were given. Some subjects received $1 for their efforts, while other subjects received $20.[2]

After the subjects had served as helpers, they were interviewed and asked to rate their opinions concerning the experiment on an eleven-point scale. The scale ranged from maximum negative opinion to

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[1]Robert Helmreich and Barry E. Collins, "Studies in Forced Compliance: Commitment and Magnitude of Inducement to Comply as Determinants of Opinion Change," Journal of Personality and Social Psychology, November, 1968, 10: 75-81.

[2]Secord and Backman, op. cit., p. 118.

maximum positive opinion.[1] As would be predicted from dissonance theory, as the amount of justification (dollars) increased, the weaker was the tendency to change private opinion to correspond with what the subject had said in the experiment.[2] As justification increases for engaging in the discrepant behavior, the magnitude of dissonance decreases; consequently, the degree of expected attitude change decreases. The results of this experiment of Festinger and Carlsmith has been a point of controversy between incentive and dissonance theorists. These differing interpretations will be discussed in a later subsection of this dissertation.

Further evidence in support of the dissonance theory interpretation comes from a subsequent study by Cohen. In the Cohen experiment college students were paid either $.50, $1, $5, or $10 to write a counter-attitudinal essay. The resulting data showed that the less the justification (dollars) for engaging in the discrepant behavior, the greater the attitude change.[3]

Aronson found dissonance results in an experiment with toy preference. In individual sessions, he asked each child to rank the attractiveness of several toys; then he indicated to the child that he could not play with the toy he had considered very attractive. Degrees of punishment were threatened for transgression. Aronson found that

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[1] Ibid., p. 118.

[2] Cohen, op. cit., p. 299.

[3] Brehm and Cohen, op. cit., pp. 73-78.

children devalued the forbidden toy only if forbidden to do so under mild punishment. The threat of severe punishment did not yield similar results.[1]

Similar dissonance results have been found by several researchers. However, incentive theorists and assimilation contrast theorists question the results of some of these experiments and have conducted experiments which support their theoretical position.

II. Review of Representative Literature Related to the Social Judgment-Involvement Approach

Assimilation contrast theorists, such as Sherif, contend that the greater the dedication of an individual to his stand on an issue (prior commitment), the less likely he is to change that stand as a result of a discrepant communication or action. In a communications study related to the 1960 presidential election, Sherif and his fellow researchers found evidence that highly involved subjects changed their attitudes less frequently than those with less personal involvement.[2] Also, there was evidence of the fact that high ego-involvement restricts the individual's assimilation range.[3] Thus, the more highly involved the individual is with the issue, the less the number of counter-attitudinal arguments will be acceptable to him.

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[1]Elliot Aronson, "The Psychology of Insufficient Justification: An Analysis of Some Conflicting Data", in Shel Feldman (ed.) Cognitive Consistency: Motivational Antecedents and Behavioral Consequents, op. cit., p. 112.

[2]Sherif, Sherif, and Nebergall, op. cit., p. 226.

[3]Carolyn W. Sherif and Muzafer Sherif, "The Social Judgment-Involvement Approach to Attitude," in Carolyn W. Sherif and Muzafer Sherif (eds.) Attitude, Ego-Involvement, and Change (New York: John Wiley and Sons, Inc., 1967), p. 152.

The logic of common sense would lead to a conclusion that a communication advocating a stand substantially different from one's own personal beliefs would lead to a rejection of that communication. Whittaker has reviewed such results based on World War II propaganda studies. In one particular instance propaganda leaflets containing photographs of conditions in a Prisoner of War camp in Canada were to be dropped behind enemy lines. Before dropping the leaflets, Army personnel decided to pretest the study with German prisoners in POW camps in Italy. The stories and photographs in the leaflet described conditions which actually existed in the Canadian camp. One of the descriptions in the leaflet described a breakfast of eggs, toast, and coffee. The prisoners on whom the leaflets were pretested had been led to believe by their German superiors that conditions in all Allied prison camps were deplorable. Although they had discovered the relatively good conditions in their own camp, they could not accept the leaflet as truthful because it was too divergent from their prior committed position.[1]

As Whittaker explains, most psychological warfare activities do not qualify as scientific experiments. Yet, he has accumulated evidence in scientific studies which shows that as the person's own position becomes more extreme, the less tolerant he is of the opposing opinions of others. In one experiment farmers were asked to choose from among nine statements concerning government controls in agriculture--

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[1]James O. Whittaker, "The Resolution of the Communication Discrepancy Issue," in Carolyn W. Sherif and Muzafer Sherif (eds.) Attitude, Ego-Involvement, and Change, Ibid., pp. 159-160.

those they found objectionable, those they found unobjectionable, and also, the one statement most representative of their own position. The results of the experiment led to the conclusion that a small discrepancy between the communication and the individual's own stand yields a small opinion change. Moderate discrepancies yield either negligible change or negative change from the communication, assuming the individual had a high degree of prior commitment.[1]

Experiments have shown that enacting a role which supports a contrary position to one's own is more effective in changing a person's opinion than just listening to the information passively or watching others play the role. From the standpoint of dissonance theory, it is possible to explain the purported change in the individual's position through the creation of psychological tension (dissonance). The dissonance can be reduced by changing toward the position advocated in the role. However, assimilation-contrast theorists frequently explain the attitude change from the standpoint of self-persuasion aspects of role playing. As Sherif, Sherif and Nebergall pointed out, role playing is usually referred to as commitment in self-persuasion experiments. The attitude change is explained by the individual becoming situationally ego-involved in doing his task well, although he may not agree with what he is saying.[2]

The importance of ego-involvement in understanding the potential attitude change as a result of role playing is also explained by Sherif, Sherif, and Nebergall:

> When agreeing to perform a task, even a mildly unpleasant one, the individual is situationally involved in performing well,

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[1] Ibid., pp. 163-176.

[2] Sherif, Sherif, and Nebergall, op. cit., p. 197.

> hence his differential attention to arguments that will help him do so. On the other hand, to the extent that he is ego-involved in his stand on the issue, the tendency to change toward the role should be less. Conversely, if he plays a role that supports his own stand, ego involvement in the task should reinforce his own stand in proportion to his involvement in it.[1]

As the proponents of the social judgment-involvement approach expect the context of attitude change to be different from that implied by dissonance theory in relation to prior commitment and commitment, the role of justification in attitude change is also viewed differently by the proponents of the two theories. From the standpoint of the assimilation-contrast theory, attitude change by an individual is more probable as the justification for making that change is increased. For example, the assimilation-contrast theorists would expect generally that to the extent the source and the communicator stand high in the individual's reference groups, the greater the possibility the individual might change his attitude.[2]

Assuming a person expresses an opinion discrepant from his personal beliefs, the larger the incentive (justification) for taking that position, the greater the likelihood he will change his attitude in the direction of the discrepant position. The more the justification, the more the expected change unless the justification involves suspicion or other negative incentives. Hunt reviewed two studies by Scott related to these premises. In one of Scott's studies a prize of $100 was offered to the winners of an elimination debate. One-third of the subjects defended a neutral position, one-third of the subjects defended their own positions, and one-third of the subjects defended a

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[1] Ibid., pp. 197-198.

[2] Ibid., p. 16.

position opposite their own. Scott discovered that winners, regardless of their own attitudes, moved toward the position they defended in the debate significantly more than did the losers. Although this study does not meet the assimilation-contrast theory requirement of knowing the magnitude of justification (incentive) beforehand, the theorists would postulate that the better the individual's performance, the more likely will be the chance that the individual will convince himself of that position.[1]

Neither dissonance theorists nor assimilation-contrast theorists would stress that their contrasting expectations concerning an individual's change of attitude would always differ as a result of isolating the effect of a single variable such as prior commitment, commitment, or justification. However, under many circumstances any of these variables or interaction of these variables could lead dissonance theorists or assimilation-contrast theorists to expect contradictory results in attitude change experiments. The theoretical points of contrast and contradictory findings are discussed in the following section of this work.

III. Contrasts in Dissonance Research and Research Related to the Social Judgment-Involvement Approach

Brehm and Cohen mentioned the effect of the importance of the dissonant cognitive element (prior commitment) to the individual in their book, Exploration in Cognitive Dissonance. They used as an

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[1]Martin Floyd Hunt, Jr., "Open- And Closed-Mindedness And Self-Persuasion: Incentive vs. Dissonance Theory," (unpublished Doctoral dissertation, Michigan State University, East Lansing, Michigan, 1969), pp. 9-10.

example a child who is induced to eat a disliked vegetable. The greater the child's initial dislike for the vegetable, the larger will be the magnitude of dissonance. The magnitude of dissonance will also be influenced by the importance of the reward the child receives for eating the disliked vegetable.[1]

Brehm and Cohen explain that the child's dissonance could be reduced in numerous ways. Dissonance might be reduced by increasing the liking for the vegetable, which would increase consonance and thus reduce dissonance. He might devalue the importance of his dislike for the vegetable, or he might reduce dissonance by magnifying the value of the reward he receives for engaging in the dissonant behavior.[2] The expectation that the greater the degree of prior commitment, the greater the probability of a change of attitude is in opposition to the stand taken by those using the logic of the social judgment-involvement approach.

The importance or relevance of a topic to an individual ego-involvement is perceived by the Sherifs as an internal anchor for the individual. The more involved the individual is in his stand, the more difficult it is to persuade him to change his position.[3] Sereno conducted a communications study to investigate if subjects highly involved in their own position would change their attitudes on a topic less than subjects with lower involvement in the topic. He also attempted to determine if highly involved subjects lowered their

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[1]Brehm and Cohen, op. cit., pp. 6-7.

[2]Ibid., p. 7.

[3]Sherif and Hovland, op. cit., pp. 174-175.

evaluation of the source more than the less involved subjects. He concluded that a highly credible source did change attitudes of lowly involved subjects significantly more than those of highly involved subjects; too, highly involved subjects tended to lower their evaluation of the source more than lowly involved subjects. In brief, his findings support the theoretical position of the Sherifs on the subject of ego-involvement.[1]

In this investigation contrasting results could be expected in view of the literature regarding the theories of cognitive dissonance and the social judgment-involvement approach. It is possible to postulate from dissonance theory that subjects with high prior commitment would be susceptible to a larger magnitude of dissonance than subjects with a lower commitment on an issue. The larger magnitude of dissonance resulting from higher prior commitment would increase the likelihood of a subject's change of attitude if that form of dissonance reduction was chosen by the individual. In contrast, on the basis of the logic used and the empirical evidence associated with the social judgment-involvement approach, it could be postulated that the more involved the subject is with his stand, the less likely he is to have a significant change of attitude.

Festinger, in discussing the magnitude of dissonance, mentioned that as the dissonance introduced by the stated disagreement of others decreases, the magnitude of dissonance decreases. In other words, consonance can be increased with the knowledge that other people hold the

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[1]Kenneth K. Sereno, "Ego-Involvement, High Source Credibility and Response to a Belief-Discrepant Communication," Speech Monographs, November, 1968, 35: 476-481.

same opinion.[1] In this investigation higher commitment connotes increased public exposure of the position taken by the subject. If the subject is taking a position contrary to his private belief, it could be expected that the magnitude of dissonance may increase as the degree of public exposure increases.

On the basis of literature related to dissonance theory, it would be expected that more attitude change would occur when subjects with the most extreme position play a role opposite their stand. This occurrence would be explained by the fact that this situation would create the greatest discrepancy for the individual and thus the greatest dissonance. The social judgment-involvement approach, on the other hand, would lead to the conclusion that the more the subject is ego-involved in his stand, the less the tendency to change his attitude toward the role he is playing. The social judgment-involvement prediction was assessed in a study by Elbing and reported by Sherif, Sherif, and Nebergall. Although Elbing found signs of a dissonance effect, he concluded that, contrary to dissonance theory, there was no tendency for subjects with an extreme stand in a role playing situation to change their attitudes more than subjects with moderate stands. Elbing found a trend in the opposite direction, that is, moderates had more attitude change. His findings support the position advocated in the social judgment-involvement approach.[2]

In a study of the interaction of commitment and dissonance, Kiesler, Pallak, and Kanouse found some typical dissonance effects,

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[1] Festinger, op. cit., p. 263.

[2] Sherif, Sherif, and Nebergall, op. cit., pp. 198-199.

as well as compartmentalization of issues. In their study commitment to consonant behavior was varied orthogonally to the degree of dissonance produced by a logically related later behavior. High commitment was identified as public use of a subject's speech; low commitment was private use of part of the subject's speech with conditions allowing for complete anonymity. Dissonance was manipulated by the degree of choice in writing a counter-attitudinal essay. The results of the experiment showed that high-dissonance subjects changed more than low-dissonance subjects on the dissonance topic. On the related commitment topic, high dissonance subjects changed more than low only under low or no prior commitment. The experimenters felt that under high commitment subjects compartmentalized the two issues.[1]

The relationship of justification and dissonance is widely discussed in the literature. A representative study of this topic is the Festinger and Carlsmith study, which aroused a great deal of interest and response, both pro and con, in the literature. After completing a dull and boring experimental task, the subject was told that a student assistant usually brought in the next subject and told him how much fun the experiment was. It was indicated that the assistant had not arrived. The student who had just completed the dull and boring task was asked to fill in for the student assistant. Two magnitudes of justification, a reward of $1 or $20, were offered to the subject for

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[1]Charles A. Kiesler, Michael S. Pallak, and David E. Kanouse, "Interactive Effects of Commitment and Dissonance," Journal of Personality and Social Psychology, vol. 8, No. 4 (March, 1968) pp. 331-338.

serving in this role. It was predicted that performance of such a belief-discrepant behavior would produce dissonance. The subjects who were given relatively low justification would experience more dissonance than subjects given the high justification. The dissonance theory position was supported as predicted; those subjects who received only $1 rated the experiment significantly higher on the post-test ratings than did the subjects receiving $20.[1]

Festinger theorized that the larger the pressure used to elicit the overt behavior, the weaker would be the tendency for the subject to change his private opinion to correspond with what he had done or said. This assumed the pressure was beyond the minimum to elicit the behavior. The results of this study were in line with Festinger and Carlsmith's prediction, but an alternate interpretation of the data was feasible on the basis that subjects paid the $1 condition worked harder at telling the interviewer that the tasks were fun and enjoyable. To determine the plausibility of such an alternate explanation, the experimenters taped each subject in an interview situation. The interviews were than transcribed and rated by two independent raters on five dimensions. The correlations between the two independent raters ranged from .61 to .88. The difference between the mean ratings for $1 and $20 subjects was not significant. The experimenters concluded that subjects paid $1 did not improvise more convincingly than those paid $20. An alternative to the dissonance explanation of the attitude change reported in subjects paid $1 did not seem reasonable, and Festinger and Carlsmith's predictions were supported.[2]

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[1]Leon Festinger and J. M. Carlsmith, "Cognitive Consequences of Forced Compliance," Journal of Abnormal and Social Psychology, 1959, 58: 203-210.

[2]Ibid., pp. 208-210.

The Festinger and Carlsmith study has been reviewed and critiqued by several people. Rosenberg, Chapanis and Chapanis, and Janis and Gilmore--all indicated concern that the large monetary incentive given for the counter-attitudinal performance may create suspicion on the part of the subject. Speaking of the dissonance studies, Rosenberg noted:

> It is only because that research has utilized strong manipulations, which many subjects may find odd or extremely surprising, that some of the critical response to these studies has focused upon the possibility that the main effects that they disclose could be artifactual in nature, or could be due to certain special and unsuspected dynamics whose clarification might limit the proper scope of dissonance theory itself.[1]

Janis and Gilmore, using a 2 x 2 x 2 factorial design, studied the independent variables of unfavorable versus favorable sponsorship, small versus large monetary reward, and overt role playing versus passive exposure. They ascertained the main effects and interaction of the three independent variables and reported the following:

> . . . . Analysis of variance of attitude scores showed that there were no significant main effects but, as predicted by incentive theory, there was a significant interaction such that more attitude change occurred when overt role playing was carried out under favorable sponsorship than under unfavorable sponsorship conditions. In general, the results fail to verify predictions from dissonance theory and tend to support an incentive theory of attitude change.[2]

Aronson disputed the conclusions reached by Janis and Gilmore, as well as the conclusions reached by Rosenberg regarding the

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[1]Milton J. Rosenberg, "Some Limits of Dissonance: Toward a Differentiated View of Counter-Attitudinal Performance," in Shel Feldman (ed.) Cognitive Consistency: Motivational Antecedents and Behavioral Consequents, op, cit., p. 143.

[2]Irving L. Janis and J. Bernard Gilmore, "The Influence of Incentive Conditions on the Success of Role Playing in Modifying Attitudes," Journal of Personality and Social Psychology, vol. 1, No. 1, 1965, p. 17.

Festinger and Carlsmith study. Aronson pointed out that under close inspection Janis and Gilmore's conditions do not correspond with those used by Festinger and Carlsmith. In particular, Janis and Gilmore did not indicate to their subjects that they would be on call as part of their obligation for receiving the agreed-upon renumeration. Aronson felt that the Janis and Gilmore procedure would arouse more suspicion than the Festinger and Carlsmith study. In brief, Aronson agreed that role playing may have an effect beyond that predictable from dissonance theory but maintained that the Janis and Gilmore study does not refute the conclusions of the Festinger and Carlsmith study nor provide an "unambiguous" test of either dissonance or incentive theory. In a similar fashion, he challenged Rosenberg's criticisms of the Festinger and Carlsmith study. Further, he indicated that a study by Arthur Cohen using sums of $.50, $1, $5, and $10 met much of Rosenberg's criticism and demonstrated the dissonance position.[1]

Festinger, Carlsmith, Cohen, Brehm, and others supported the inverse relationship between justification and attitude change as suggested by dissonance theory. Studies by incentive theorists and those using the logic of the social judgment-involvement approach to attitude change, such as Sherif and Sherif, Elbing, Nebergall, and others, yielded results contrasting to those suggested by dissonance theory. Although there has been extensive analysis and interpretation of the data from these and other studies, there is not a large

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[1]Elliot Aronson, "The Psychology of Insufficient Justification: An Analysis of Some Conflicting Data," in Shel Feldman (ed.) Cognitive Consistency: Motivational Antecedents and Behavioral Consequents, op. cit., pp. 109-131.

degree of common agreement among the various schools of thought related to the effect of justification on attitude change.

IV. An Overview of Literature Pertinent to this Study

A number of recent studies supported two or more approaches to the study of attitude change. The approach postulated in dissonance theory and the position advocated in the social judgment-involvement approach both evaluated what takes place when the individual is presented information which is discrepant from his initial position. Individuals representing these two schools of thought acknowledged that role playing may have greater influence on attitude change than merely receiving passive information. Role playing in this study is related to commitment. Also involved in this study are the variables of prior commitment and justification.

Prior commitment in this study is defined as the degree of personal involvement or importance of the issue to the individual. In dissonance theory a greater change of attitude is predicted the more discrepant the communication or role playing situation is from the individual's private position. As reported by Rand, the social judgment-involvement approach of Sherif predicts that with great discrepancy between one's own position and that advocated in a contrary communication or role, little or no change of attitude would occur. Small or moderate discrepancies between a person's initial position and that advocated in a discrepant communication or role will more likely result in a change of attitude.[1]

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[1]Rand, op. cit., p. 1128-A.

Subjects under high commitment in this study will be under the assumption that they are to outline and later record an identified speech supporting high non-resident tuition for state universities, to be played over closed-circuit television, the local educational television station, and possibly other locations. Subjects in a low commitment situation are told that they may be asked to record their speech on the same topic in an anonymous situation over radio. As further assurance to anonymity, it was indicated that only certain statements from their speeches would be selected for broadcasting. From the framework of dissonance theory it would be expected that subjects with extreme positions playing a role opposite their stand would feel a significant magnitude of dissonance. Using the framework of the social judgment-involvement approach to attitude change, Sherif, Sherif, and Nebergall indicated that Elbing did not find a tendency for subjects with extreme stands to change more in a role playing situation than subjects with moderate stands. To the contrary, he found that moderate subjects changed more in role playing situations than extreme subjects.[1]

Dissonance theory framework led to the prediction of an inverse relationship between the amount of justification for engaging in a belief-discrepant behavior and the corresponding magnitude of dissonance. Festinger stated:

> The magnitude of the dissonance resulting from an attempt to elicit forced compliance is greatest if the promised reward or threatened punishment is either <u>just</u>

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[1]Sherif, Sherif, and Nebergall, <u>op. cit.</u>, pp. 197-199.

> sufficient to elicit the overt behavior or is just barely not sufficient to elicit it.[1]

From the framework of the social judgment-involvement approach to attitude change, it would be expected that to the extent the greater the justification given for engaging in a belief discrepant behavior, the greater the possibility the individual would change his attitude.

McGuire, in discussing the discrepancy-involvement question, stated:

> Another persuasion area in which consistency theories have been applied with a stimulating degree of theoretical controversy and an attractive amount of empirical ambiguity has been that of the discrepancy-involvement question. How does the amount of attained opinion change vary as a function of the amount of change urged, and how does this relationship vary as the believer's "involvement" increases? There seem to be opposite predictions on the basis of dissonance theory (Zimbardo. . .) and of assimilation-contrast theory (M. Sherif and Hovland, . . . C. W. Sherif et. al. . . .). Zimbardo. . . has proposed a plausible reconciliation, but the issue is still in doubt. . .[2]

McGuire's statement would be applicable to this study. Neither dissonance theory nor assimilation-contrast theory can be ignored in this study, and both theories will be of use in interpreting the results of this investigation.

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[1]Festinger, op. cit., pp. 262-263.

[2]William J. McGuire, "The Current Status of Cognitive Consistency Theories," in Shel Feldman (ed.) Cognitive Consistency: Motivational Antecedents and Behavioral Consequents, op. cit., p. 19.

CHAPTER III

PLAN OF PROCEDURE

The purpose of this investigation was to study if a change of attitude could be induced and explained by dissonance in subjects with high prior commitment about an issue. This chapter is a description of the procedures followed in this study and includes a description of the population, the experimental design and methodology, the measuring instrument, a statement of hypotheses, a description of the statistical techniques used for analysis of the data, and a summary.

I. Description of the Population

The subjects in this investigation were all students at Wisconsin State University-Superior. This University is the smallest in the Wisconsin State University System, but it has a proportionally large graduate school. In the 1968-69 school year approximately one-fourth of the students were non-residents. Prior to the 1969-70 school year, tuition and fees for non-resident students in the Wisconsin State University System were greatly increased. During the 1968-69 school year, non-resident tuition and fees for the full-time students at Superior were $378 for the undergraduate students and $412 for the graduate students. Undergraduate non-resident tuition and fees for 1969-70 were $655, while graduate non-resident tuition and fees were $786. The guidelines for the 1969-70 fee structure

were not received by the University in time to alert most non-resident students of the fee changes prior to the students' return to campus.

At the time this experiment was conducted, students were aware of a further proposed increase in tuition and fees for the 1970-71 school year, as well as an increase in summer session fees for full-time non-resident students from a 1969 level of $202 for undergraduates and $204 for graduate students to a 1970 level of $330 for undergraduates and $405 for graduate students.

On the basis of public announcements, informal interviews, and newspaper editorials, it was decided that most students on the Superior campus had strong opposition to the proportionately large increase in non-resident tuition and fees. For the purpose of this investigation, non-resident students were arbitrarily designated as having high prior commitment about this issue. Resident students were designated as having low prior commitment. It was known that most students had strong feelings about the issue, but it was reasonable to expect that non-residents were more affected by the tuition and fee increase and should be designated as a separate group from the resident students.

The non-residents' commitment against the raise in tuition and fees was evidenced in informal interviews, campus and local newspaper editorials, and a petition by representatives of students and faculty to the University's Board of Regents requesting that they use their powers to influence a reduction of non-resident tuition and fees. In both the Registrar's Office and the Veterans' Affairs Office there was a major increase of non-resident students requesting that

their records be sent to prospective new schools of enrollment, and numerous appeals were made to the Financial Aids Office for assistance in relieving the high increase of cost to the student. The position of non-resident students was further demonstrated at a later time by a 43 percent decrease in non-resident freshmen seeking admission to the Wisconsin State University System for the 1970-71 school year.[1]

Students were aware that resident tuition and fees had increased about 32 percent in the State University System while non-resident tuition and fees had increased 84 percent.[2] The Executive Director of the Wisconsin State University System discussing non-resident enrollment ceilings, indicated they were useless because of the declining non-resident enrollment. He stated, "Tuition and fees have taken care of that. . ."[3] It was acknowledged that the non-residents felt strongly about the increased costs and the reasons they believed had brought about the increase. From groups designated with high prior commitment and low prior commitment, a total of 145 subjects were ultimately used in the experiment and were distributed throughout the experimental design as illustrated in Table 1.

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[1]"Fewer Non-Residents Apply to State U's," Peptomist (Wisconsin State University-Superior), April 29, 1970, p. 3.

[2]"Increasing Fees Affect Wis. College Enrollments," Peptomist (Wisconsin State University-Superior), November 19, 1970, p. 5.

[3]Jeff Smoller, "High Fees Cut Numbers of Non-Resident Students," Capital Times (Madison, Wisconsin), September 28, 1970.

TABLE 1

THE POPULATION USED IN THE INVESTIGATION

	Low Prior Commitment		High Prior Commitment	
	Low Commitment	High Commitment	Low Commitment	High Commitment
Low Justification	25	16	11	6
High Justification	22	30	10	9
Control	8	4	2	2

II. The Experimental Design and Methodology

The subjects, students at Wisconsin State University-Superior, were part of an experiment that had 2 x 3 x 2 factorial design, as illustrated in Table 1. The conditions of the experiment consisted of subjects designated as having high prior commitment who were placed in a situation where it was necessary to perform a belief discrepant behavior. These subjects were given one of two levels of verbal justification for engaging in the discrepant behavior under two levels of commitment. Commitment was differentiated by the degree of supposed public exposure the subject was to receive while engaging in the belief discrepant behavior. Similar groups designated as having low prior commitment were structured as part of the experiment. In addition, control groups having either low or high prior commitment under two levels of commitment but with only one intermediate level of verbal justification were created. The control groups, like the experimental groups, received both a pre-test and a post-test, but the control groups did not perform an interim belief discrepant behavior.

In the spring of the 1969-70 school year the instrument, a semantic differential, was administered in a pre-test situation. The pre-test was administered by the regular instructor in previously selected classes. The pre-test, experiment, and post-test had been discussed at length with each participating instructor. At the time of the pre-test the instructor announced:

> One of the graduate students is compiling statistical data on the basis of the semantic differential. He has asked me if you would be willing to fill out these forms to assist him in the statistical project. Your name is not needed, as this information will be used only for a statistical exercise. However, it would be appreciated if you would put your social security number in the space provided for your name. These statistics will be analyzed on the computer, which has a program based on social security numbers. This should only take you a short length of time and will be of some assistance to the graduate student. (See Appendix B.)

The pre-test semantic differential was then administered to the students who later participated in the experiment.[1] Within two weeks of the pre-test, the classroom instructor indicated to the class that they had been chosen to participate in an experiment dealing with the ability of future members of professional groups to develop and to support logical arguments. Specific directions were read to each experimental group by the instructor.[2]

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[1]The semantic differentials used for both the pre-test and post-test are presented in Appendix A.

[2]The directions given to each of the experimental groups are presented in Appendix B.

The experimental groups were asked to prepare a three-minute speech supporting high non-resident tuition for state universities. Prior to starting the outline of their speech, subjects in a high commitment situation were told in part:

> I will give you twenty minutes to outline your speech and the arguments pertinent to your speech. Please do it on this paper and sign your name in the upper right-hand corner. Prior to starting your writing we would like to focus the camera on each of you, so that we may test the television equipment. Please look at the monitor. At a later date you will be expected to record the speeches on video-tape at the television studio. For the purpose of the demonstration it will be necessary that you identify yourself and make your speech as forceful as possible. Those people who will see your speech will assume you believe what you say. (See Appendix B.)

In contrast, subjects in low commitment situations were told:

> I will give you twenty minutes to outline your speech and the arguments pertinent to your speech. Please do it on this paper and sign your name in the upper right-hand corner. The student (the word "those" was substituted for the words "the student" in the high justification group) making this study will randomly select most of you to go up to the radio station to record your speech. Please do not be concerned about signing your name. Once the random selections have been made, you will no longer be identified as an individual. The name is merely to identify you so that you may be requested to come and record your speech. Your

speech will then be further edited and spliced, so that any possibility of your being identified as an individual is non-existent. (See Appendix B.)

The statements read to the subjects also contained a description of what they were being asked to do and how they were expected to complete the tasks. In the experimental groups the introductory statements were varied slightly depending on the commitment level and justification level of the group. Similar introductory remarks were given to the control group. Near the completion of the directions each group was informed, "You do not have to participate if you choose not to do so."

The experimental groups who were asked to perform a belief discrepant behavior were given varied amounts of verbal justification for committing the act. In high justification conditions, subjects were told that the experiment was being conducted by one of the staff members in conjunction with some of his students under the auspices of a well-known organization. Subjects were told that the experimenter hoped to make both the televised and the audio recordings into a demonstration model to be used in classes throughout the country for problem solving and other logic oriented projects. It was further explained that the experiment could produce new information about cognitive processes. The classroom instructor said:

If the group doing the project is able to produce the results they expect, your time will be well spent because your efforts will lead to new knowledge in cognitive structure, as well as to the development of a major learning unit. (See Appendix B.)

The subjects in low justification groups were told that the experiment was being conducted by a graduate student who needed their assistance.

After the experiment was completed, the classroom instructor of each group concluded by stating:

> I have another favor to ask of all of you. You have just taken time in preparation for engaging in a publicly televised speech (anonymously recorded radio speech). Previously, I had asked you to help one of our graduate students in a statistical project. Unfortunately, after the data was placed on the computer, the tapes were erased and all data was lost. He has asked us to fill out the semantic differential again. As we have already lost some of our class time, we might as well assist the fellow in his project. However, this time if he has problems with losing his data, we will ask him to collect it in another class. (See Appendix B.)

The procedures utilized with the experimental groups were duplicated where possible with the control group, except the control subjects were not requested to perform an interim belief discrepant behavior. The subjects in the control situations outlined speeches on the same issue, high tuition and fees for non-resident students in Wisconsin institutions of higher education, but in agreement with their own beliefs.

III. Description of the Measuring Instrument

Das reports the development of the semantic differential had its beginning in the research of Stagner and Osgood on social

stereotypes.[1] In 1942, Karwoski, Odert, and Osgood began using the concept of a pair of polar opposites to describe two or more dimensions of experience.[2] By 1952, Osgood had described the semantic differential and the logic underlying the instrument. In 1957, a definitive description of the instrument, as well as the theoretical and empirical evidence related to it, was published in The Measurement of Meaning.[3]

The logic of the instrument was summarized by Osgood and Sebeok, who indicated:

> 1) The process of description or judgment can be conceived as the allocation of a concept to an experiential continuum defined by a pair of polar terms.
>
> 2) Many different continua of judgment are essentially equivalent and hence may be represented by a single dimension.
>
> 3) A limited number of such continua, representative of the dimensionality of meaningful judgments, can be used to define a semantic space within which the meaning of any concept can be specified.[4]

The semantic differential is in part a combination of controlled association and scaling procedures. The subject is provided with a concept to be differentiated and a set of bipolar

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[1]Rhea A. Das, "Semantic Differential Measurement of the Bengali Meaning System," Journal of Psychological Researchers Vol. 13, No. 3, 1969, pp. 131-148.

[2]Donavan E. Coleman, "The Classical Conditioning of Attitudes Toward Selected Educational Concepts," (unpublished Ed. D. Dissertation, University of South Dakota, Vermillion, South Dakota, 1966), p. 66.

[3]Charles E. Osgood, George J. Suci, and Percy Tannenbaum, The Measurement of Meaning (Urbana: University of Illinois Press, 1957).

[4]Charles E. Osgood and Thomas A. Sebeok (eds.) Psycholinguistics: A Survey of Theory and Research Problems (Bloomington: Indiana University Press, 1965), pp. 177-178.

adjective scales, against which he will make the differentiation.[1] In this investigation a seven-step scale was provided for the subject to indicate the direction of his association with the concept and the intensity of that association.

Osgood developed two basic forms of the semantic differential. In one form the concept is placed parallel with the adjective pairs. In the other form only one concept appears on each page, and all judgments related to that concept are made consecutively. Although he felt the first form was not as adequate as the form illustrated below, Osgood's research did not show a significant difference between the results of the two forms.[2]

HIGH NON-RESIDENT TUITION

good	___:___:___:___:___:___:___	bad
small	___:___:___:___:___:___:___	large
hot	___:___:___:___:___:___:___	cold

The form illustrated above was utilized in this study.

The research of Osgood and his associates yielded three dominant factors or dimensions of semantic space--the evaluative, potency, and activity factors. Adjective pairs representing all three dimensions were used in this investigation. Diab explained:

> . . . it is evident that the semantic differential procedure does give more information about the meaning of the attitude object than can be obtained from the evaluative dimension alone, and consequently, helps to improve prediction of the individual's behavior in situations involving the attitude object.[3]

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[1] Osgood, Suci, and Tannenbaum, op. cit., p. 20.

[2] Ibid., p. 82.

[3] Lufty N. Diab, "Measurement of Social Attitudes: Problems and Prospects," in Carolyn W. Sherif and Muzafer Sherif (eds.) Attitude, Ego-Involvement, and Change, op. cit., p. 155.

The adjective pairs chosen for this investigation were taken from those originally studied by Osgood and his associates. The pairs chosen met the criteria established by the authors and crossed the three major dimensions of semantic space. The directions for and the semantic differential used in this investigation appear in Appendix A.

The reliability of the instrument could be described as the consistency of the instrument. If the instrument is reliable, the measurement units will be similar from time to time. Osgood's study of the test-retest reliability of the subjects on 100 subjects yielded a coefficient of reliability of .85.[1] Osgood and his associates mention numerous studies that substantiate, to their satisfaction, the reliability of the semantic differential.

The validity of the instrument, that is, the question of whether the instrument measures what it is supposed to measure, has undergone extensive analysis. Osgood established the "face validity" of the instrument in The Measurement of Meaning. The criterion of external correlation as presented by Osgood is discussed by Coleman. According to Coleman, Osgood has indicated that on the evaluative factor correlations of .90 or better were found between Thurstone's Attitude Scale and the semantic differential. Similarly, highly significant rank order coefficients with the Guttman scale were obtained.[2] An investigation by Smith concerning the validity of the semantic differential as a means for rating speaker effectiveness led to conclusions supportive of the validity of the instrument. Smith found

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[1]Osgood, Suci, and Tannenbaum, op. cit., pp. 126-127.

[2]Coleman, op. cit., pp. 74-75.

significant relationships between the semantic differential and student speaker self-ratings, as well as instructor ratings of most-able, least-able subgroups. These and other findings led him to conclude that the semantic differential is a valid means of measuring speaking ability through student self-ratings and is a valid instrument for instructors to use in measuring speaking ability.[1]

The research of Kelly and Levy led them to conclude, in part, that their results supported the validity of the semantic differential as an adequate way of measuring the connotative meaning of concept.[2] Further evidence was presented by Grigg. He indicated that a result favorable to the validity of the semantic differential was illustrated by a group of normal subjects who indicated a significantly greater distance between "ideal self" and neurotic than between neurotic and self.[3]

As reflected in Table 2, the data collected as part of this investigation lend support to the work of Osgood and his associates.

TABLE 2

WITHIN CELLS CORRELATION MATRIX LISTED BY CORRESPONDING SEMANTIC DIFFERENTIAL SCALES

EVL - T2		POT - T2		ACT - T2	
EVL - F2	0.914266	POT - F2	0.663011	ACT - F2	0.611503
EVL - T1	0.834311	POT - T1	0.592291	ACT - T1	0.443542
EVL - F1	0.821319	POT - F1	0.517830	ACT - F1	0.465337

[1]Raymond G. Smith, "Validation of a Semantic Differential," Speech Monographs, March, 1963, 30: 50-55.

[2]Jane A. Kelly and Leon H. Levy, "The Discriminability of Concepts Differentiated by Means of the Semantic Differential," Educational and Psychological Measurement, Spring, 1961, 21: 53-57.

[3]Austin E. Grigg, "A Validity Study of the Semantic Differential Technique," Journal of Clinical Psychology, April, 1959, 15: 179-181.

a. the number 1 after the letter T or F represents pre-test

b. the number 2 after the letter T or F represents post-test

c. the letter T represents the concept of high non-resident tuition

d. the letter F represents the concept of increased fees for non-resident students

e. the letters EVL represent the evaluative scale of the semantic differential

f. the letters POT represent the potency scale of the semantic differential

g. the letters ACT represent the activity scale of the semantic differential

Relatively high correlations are obtained when one evaluative scale is compared with another evaluative factor or potency is compared with potency and activity is compared with activity scales. In contrast, the correlation between the evaluative scale on the concept related to tuition in the post-test situation and the activity scale on the concept related to fees in the pre-test situation is 0.052760. Although not shown in Table 2, similar low correlations existed between all contrasting scales. Such results are expected on the basis of Osgood and his associates' earlier work, and Table 2 is illustrative of the reliability and validity of their work.

Osgood's work is further substantiated by the data in Table 3.

TABLE 3

STANDARDIZED REGRESSION COEFFICIENTS--INDEPENDENT BY DEPENDENT VARIABLES

	EVL - T2	POT - T2	ACT - T2	EVL - F2	POT - F2	ACT - F2
EVL - T1	0.510086	0.121833	-0.038848	0.212767	-0.053291	0.265830
POT - T1	-0.069975	0.431534	0.034183	-0.178488	0.117563	0.092861
ACT - T1	0.124334	-0.096352	0.248890	0.151188	-0.138476	0.263799
EVL - F1	0.345777	-0.211533	0.063478	0.567140	0.003201	-0.227359
POT - F1	0.074289	0.247899	0.001317	0.146807	0.376258	0.110554
ACT - F1	-0.118803	0.100530	0.306915	-0.145531	0.193619	0.220053

a. the number 1 after the letter T or F represents pre-test

b. the number 2 after the letter T or F represents post-test

c. the letter T represents the concept of high non-resident tuition

d. the letter F represents the concept of increased fees for non-resident students

e. the letters EVL represent the evaluative scale of the semantic differential

f. the letters POT represent the potency scale of the semantic differential

g. the letters ACT represent the activity scale of the semantic differential

The relative value per unit of evaluation is higher when corresponding scales are related; i.e., the standardized coefficient is higher between evaluative (EVL) scale and evaluative scale than between evaluative scale and activity (ACT) scale or potency (POT) scale. It is expected from the writings of Osgood that such relationships would exist, and in effect this data lends support to validity and reliability studies of the semantic differential previously conducted by Osgood and others.

IV. Hypotheses Used in this Investigation

The semantic differential can be used as a generalized attitude measurement technique, provided the evaluative adjective pairs are used.[1] The instrument has had extensive use and is a generally accepted instrument for measuring attitude and attitude change. In this investigation a semantic differential instrument was used as a pre-test and post-test measure in relation to the following hypotheses:

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[1]Fred N. Kerlinger, Foundations of Behavioral Research, (New York: Holt, Rinehart, and Winston, Inc., 1964), p. 579.

H1: A change of attitude can be induced and explained by dissonance in subjects who have a high degree of prior commitment.

H2: When subjects are engaging in a belief discrepant behavior, a high commitment situation and a low commitment situation do not result in the same amount of attitude change.

H3: Subjects receiving verbal justification for engaging in a belief discrepant behavior do not experience the same amount of attitude change as other subjects receiving less justification for engaging in a belief discrepant behavior.

These hypotheses were evaluated in light of data analyzed through an analysis of covariance.

V. Statistical Techniques Used for the Analysis of the Data

The design of this study might best be described by what Campbell and Stanley call "the nonequivalent control group design".[1] The subjects in this investigation were chosen from regularly scheduled college classes. With the exception of the control group, students were not assigned at random to treatment groups. The experiment was conducted within the confines of the regular classroom; the pre-tests and post-tests were also administered in the classroom. If the appropriate assumptions are met, the design should control the main effects of history, maturation, instrumentation, and testing.[2]

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[1]Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research, (Chicago: Rand Mcnally and Company, 1963), p. 47.

[2]Ibid., p. 48.

Due to the nature of the experimental design, a multivariate analysis of covariance was chosen to analyze the data. The analysis of covariance is explained by Kerlinger:

> . . .a form of analysis of variance that tests the significance of the differences between means of final experimental data by taking into account and adjusting initial differences in the data. That is, the analysis of covariance analyzes the differences between experimental groups on Y after taking into account either initial differences in the Y measures or differences in some pertinent independent variable.[1]

In this investigation the pre-test scores were used as the covariates. This form of analysis will help to control the group differences statistically. The analysis should result in a smaller estimate of experimental error in comparison to an analysis of variance of the measures.[2] The net result of using the analysis of covariance should result in a more precise analysis of the data.

Campbell and Stanley warn that in designs similar to the one used in this investigation a problem with regression is possible.[3] The purported regression is often attributed to either correlated measures or the selection of subjects on the basis of extreme pre-test scores. It is expected the more deviant the score, the larger will be the error of measurement.[4] As this investigation involves subjects

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[1]Kerlinger, op. cit., pp. 347-348.

[2]Allen L. Edwards, Experimental Design in Psychological Research (New York: Holt, Rinehart, and Winston, Inc., 1968), p. 326.

[3]Campbell and Stanley, op. cit., pp. 47-50.

[4]Donald T. Campbell and Julian C. Stanley, "Experimental and Quasi-Experimental Designs for Research on Teaching," in N. L. Gage (ed.) Handbook of Research on Teaching (Chicago: Rand McNally and Company, 1963), p. 181.

with extreme stands and a potential for correlated measures, a multivariate analysis of covariance was chosen to analyze the data. The analysis was done with a Fortran program written by Finn of the State University of New York at Buffalo and modified for use at Michigan State University by Wright.[1] The computer analysis chosen for the investigation allowed not only for a univariate or multivariate analysis of covariance but also for related transformations, cell means, least square estimates, regression analysis, and canonical correlations, as well as hypotheses tests related to the investigation.[2]

VI. Summary

The 145 subjects in this investigation were students at Wisconsin State University-Superior. The University is a member of a nine-university state system which had to implement a dramatic increase in non-resident tuition just prior to the beginning of the 1969-70 school year. Circumstances allowed for almost no advance notice of the high increase in fees to either new or returning non-resident students. Evidence led to the conclusion that all students had strong feelings about this issue.[3] Arbitrarily, resident students were designated as having low prior commitment and non-residents

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[1]An abbreviated description of the forms of analysis and program created by Jeremy Finn and modified by David Wright appears in Appendix C.

[2]An abbreviated description of the forms of analysis and program created by Jeremy Finn and modified by David Wright appears in Appendix C.

[3]The Coordinating Council of Higher Education in Wisconsin has reported that tuition and fees in the Wisconsin State University System rose 91.1 percent between 1967 and 1970 with a corresponding decrease of 41.5 percent in new freshman enrollment during the same period.

were designated as having high prior commitment. Although it was assumed that most of the potential subjects had strong feelings about the issue, it was determined for the purpose of this investigation to designate the resident and non-residents as separate groups.

All the subjects designated as having either low prior commitment or high prior commitment were either placed in experimental groups where they were forced to participate in a belief discrepant behavior or in a control group. The experimental and control group subjects were placed in a high commitment situation (proposed-televised-publicly identified use of statements) or in a low commitment situation (proposed-anonymous-non video recorded use of statements). The subjects in the experimental groups were given either a high or low amount of verbal justification for participating in the belief discrepant behavior. Subjects in the control situations were given one level of justification.

The investigation had a 2 x 3 x 2 factorial design. A semantic differential was administered in a pre-test and post-test situation. The resulting data fit into one of twelve cells and was subjected to multivariate analysis of covariance. The hypotheses to be tested were related to the ability of dissonance to induce and to explain attitude change in individuals, as well as to explore the effect of commitment and justification on the proposed attitude change.

CHAPTER IV

ANALYSIS OF DATA

This investigation was centered upon the ability of dissonance to induce and to explain a change of attitude in subjects with a high degree of prior commitment about an issue. The effects of commitment and justification were also reviewed in the analysis to determine if they contributed to any purported change of attitude. The data consisted of semantic differential scores which were analyzed through the use of both multivariate and univariate analyses of covariance. The analysis of the data was divided into two primary areas: 1) the applicability and appropriativeness of the measuring instrument and statistical techniques used in the investigation, and 2) a series of statistical tests related to the hypotheses of the investigation. Specifically tested were the effects of:

1. low prior commitment vs high prior commitment
2. low justification vs control and high justification vs control
3. low commitment vs high commitment
4. prior commitment x justification interaction
5. prior commitment x commitment interaction
6. justification x commitment interaction
7. prior commitment x justification x commitment interaction

I. Appropriativeness of the Instrument and Analysis

The independence of the scale values of the semantic differential is illustrated in Table 4.

TABLE 4

MATRIX OF CORRELATIONS AFTER ADJUSTING FOR THE EFFECTS OF THE CO-VARIABLES WITH RELATED VARIANCE AND STANDARD DEVIATION

	EVL - T2	POT - T2	ACT - T2	EVL - F2	POT - F2	ACT - F2
EVL - T2	--------					
POT - T2	-0.163244	--------				
ACT - T2	0.029946	0.397267	--------			
EVL - F2	0.757459	-0.096833	0.020242	--------		
POT - F2	-0.113022	0.546281	0.329791	-0.066424	--------	
ACT - F2	0.121057	0.069312	0.478542	0.091115	0.216737	--------

Degrees of Freedom	Variable	Variance	Standard Deviation
127	EVL - T2	369.615842	19.2254
	POT - T2	34.137523	5.8427
	ACT - T2	16.965510	4.1189
	EVL - F2	471.851282	21.7221
	POT - F2	42.257394	6.5006
	ACT - F2	17.702325	4.2074

a. the letter T represents the concept of high non-resident tuition

b. the letter F represents the concept of increased fees for non-resident students

c. the letters EVL represent the evaluative scale of the semantic differential

d. the letters POT represent the potency scale of the semantic differential

e. the letters ACT represent the activity scale of the semantic differential

The independence of the scale values of the semantic differential is illustrated by the low correlations between scales. The correlation between the evaluative scale on the tuition concept at the post-test level and activity scale on the tuition concept at the post-test level is 0.029946 and is exemplary of the independence between scales. This fact is further substantiated by the high correlation between concepts on the same scale, for example, a correlation of 0.757459 between the post-tests on the evaluative scale for the two concepts related to tuition and fees.

A chi square test of hypothesis of no association between dependent and independent variables showed that a covariate analysis was needed. The high degree of relationship between pre-test and post-test variables is shown in Table 5.

TABLE 5

REGRESSION ANALYSIS WITH THE SIX PRE-TESTS AS COVARIATES

Variable	Multiple R	F	P Less Than
EVL - T2	0.8564	58.2507	0.0000
POT - T2	0.6458	15.1403	0.0001
ACT - T2	0.5129	7.2570	0.0001
EVL - F2	0.8165	42.3427	0.0000
POT - F2	0.5286	8.2091	0.0001
ACT - F2	0.5489	9.1287	0.0001

df
6 for hypothesis
127 for error

a. the letter T represents the concept of high non-resident tuition

b. the letter F represents the concept of increased fees for non-resident students

c. the letters EVL represent the evaluative scale of the semantic differential

d. the letters POT represent the potency scale of the semantic differential

e. the letters ACT represent the activity scale of the semantic differential

The ability to predict post-test results from the pre-test is indicated by the high correlations. The degree of relationship is significant at p=.01 level on all scales and all concepts.

Das has explained the usefulness of canonical analysis in multivariate investigations. She stated: "Canonical analysis deals with the correlations within and between two sets of variables, and gives the linear combinations of the variables with maximum correlation in each set."[1] The canonical correlations and the percent of variation in the dependent variables that the correlations accounted for are illustrated in Table 6.

TABLE 6

CANONICAL CORRELATIONS AND THE PERCENT OF VARIATION IN DEPENDENT VARIABLES

Canonical Correlation		Percent of Variation
1	0.8616	12.3722
2	0.6778	7.6566
3	0.4925	4.0424
4	0.4002	2.6696
5	0.1856	0.5741
6	0.1203	0.2414
	Total % =	27.5563

[1]Rhea S. Das, "An Application of Factor and Canonical Analysis to Multivariate Data," The British Journal of Mathematical and Statistical Psychology, May, 1965, Vol. 18, Part I, p. 59.

The first canonical correlation (.8616) represents the degree of relationship between the weighted scores of the pre-test (six variables) and the post-test (six variables) when the weights have been chosen to get maximum correlation between the two matrices. After analysis of the canonical correlation, 72.4437 percent of the variance in the dependent variables remained unexplained. Due to the design of the study, the unexplained variance would not be attributed to subject differences.

II. Tests of Significance

The first hypothesis to be reviewed in this investigation was related to an attempt to explore if a change of attitude could be induced and explained by dissonance in subjects who had a high degree of prior commitment. Post-test scores with the pre-test as the covariate were subjected to an analysis of covariance. The cell means for all variables are presented in Table 7.

In order to determine if a statistically significant change of attitude had occurred in the experimental groups, a multivariate analysis of covariance was utilized. A summary table of the multivariate analysis of covariance is presented in Table 8. As indicated in Table 8, no statistically significant differences were found between the equality of mean vectors. On this basis, the null hypothesis related to a change of attitude induced and explained by dissonance in subjects with a high degree of prior commitment could not be rejected.

TABLE 7

CELL MEANS FOR BOTH POST-TEST
AND PRE-TEST RESULTS

		Low Justification		High Justification		Control	
		Low Commitment	High Commitment	Low Commitment	High Commitment	Low Commitment	High Commitment
Low Prior	EVL - T2	99.68	97.50	76.05	87.07	110.00	104.25
	POT - T2	46.32	46.31	47.27	44.20	42.75	40.00
	ACT - T2	25.76	26.94	25.23	24.13	25.13	23.50
	EVL - F2	99.00	93.63	79.50	86.70	101.63	104.00
	POT - F2	43.32	44.75	45.91	42.87	44.88	39.25
	ACT - F2	27.04	26.06	24.05	24.10	23.88	23.00
	EVL - T1	94.24	110.25	78.68	91.77	116.00	109.25
	POT - T1	47.40	46.31	51.36	45.20	45.63	42.50
	ACT - T1	25.80	28.13	24.91	25.13	26.13	24.00
	EVL - F1	97.32	97.94	76.36	89.23	117.00	104.75
	POT - F1	44.16	47.13	46.73	43.33	41.13	41.00
	ACT - F1	26.44	27.88	26.59	25.73	24.75	24.50
High Prior	EVL - T2	83.73	74.33	56.80	88.89	133.00	96.50
	POT - T2	47.09	42.83	54,40	44.11	37.00	41.00
	ACT - T2	27.73	25.67	29.20	24.22	24.00	23.50
	EVL - F2	80.45	81.17	52.10	92.22	131.50	88.00
	POT - F2	47.00	40.00	56.00	40.44	37.00	41.50
	ACT - F2	27.91	25.17	28.90	26.44	24.00	25.50
	EVL - T1	81.73	83.00	63.80	91.67	126.50	110.50
	POT - T1	49.73	41.67	51.60	47.89	35.50	47.00
	ACT - T1	28.45	23.67	27.30	25.56	24.00	23.50
	EVL - F1	77.91	78.00	61.90	89.67	136.00	110.00
	POT - F1	46.73	40.67	47.70	43.44	43.00	45.00
	ACT - F1	28.36	23.33	26.40	26.78	24.00	25.00

a. the number 1 after the letter T or F represents pre-test

b. the number 2 after the letter T or F represents post-test

c. the letter T represents the concept of high non-resident tuition

d. the letter F represents the concept of increased fees for non-resident students

e. the letters EVL represent the evaluative scale of the semantic differential

f. the letters POT represent the potency scale of the semantic differential

g. the letters ACT represent the activity scale of the semantic differential

TABLE 8

SUMMARY TABLE OF F RATIOS--LISTED BY EXPERIMENTAL CONDITION FOR MULTIVARIATE TESTS OF EQUALITY OF MEAN VECTORS

Condition	df	F	P Less Than
Low Prior Commitment vs High Prior Commitment	6 and 122	1.1486	0.3385
Low Justification vs Control and High Justification vs Control	12 and 244	0.7577	0.6937
Low Commitment vs High Commitment	6 and 122	1.4147	0.2143
Prior Commitment x Justification Interaction	12 and 244	0.7143	0.7371
Prior Commitment x Commitment Interaction	6 and 122	2.0446	0.0648
Justification x Commitment Interaction	12 and 244	1.0541	0.4001
Prior Commitment x Justification x Commitment Interaction	12 and 244	1.2069	0.2787

Although the multivariate analysis of covariance did not indicate any statistically significant data, a series of univariate analyses were performed. The univariate analysis was chosen due to the independence of the scales of the semantic differential. The univariate analysis would allow for a review of the data related to each of the three scales of the semantic differential and would improve the investigation. Table 9 presents a summary of the univariate analysis of low prior commitment vs high prior commitment. The low prior commitment groups and the high prior commitment groups were significantly different statistically only on the activity scale, and then only on the concept related to fees.

TABLE 9

SUMMARY TABLE OF ANALYSIS OF LOW PRIOR COMMITMENT
VS HIGH PRIOR COMMITMENT
(1 df for Hypothesis)
(127 df for Error)

Variable Post-Test Measure	Between Mean Square	Univariate F	P Less Than	
EVL - T2	56.5198	0.1529	0.6965	n.s.
POT - T2	20.7510	0.6079	0.4371	n.s.
ACT - T2	41.5512	2.4492	0.1201	n.s.
EVL - F2	168.4781	0.3571	0.5513	n.s.
POT - F2	83.6329	1.9791	0.1620	n.s.
ACT - F2	101.5838	5.7384	0.0181	*

* = Significant (P=.05)

n.s. = Non-Significant

The Effects of Commitment:

The second hypothesis of this investigation was related to determining if, while engaging in an act which is discrepant with one's private belief, a high commitment situation (proposed-televised-publicly identified use of statements) or a low commitment situation (proposed-anonymous-non video recorded use of statements) results in the subjects having a greater change of attitude. A univariate analysis with the six covariates eliminated was in part utilized to examine the effect of commitment. Table 10 illustrates the effect of the commitment variable. The only statistically significant difference in Table 10 is related to the potency scale of the semantic differential, and then only on the concept related to fees. The statistical information pertinent to the second hypothesis did not allow for a rejection of the related null hypothesis.

TABLE 10

SUMMARY TABLE OF ANALYSIS OF LOW COMMITMENT
VS HIGH COMMITMENT
(1 df for Hypothesis)
(127 df for Error)

Variable Post-Test Measure	Between Mean Square	Univariate F	P Less Than	
EVL - T2	871.9802	2.3592	0.1271	n.s.
POT - T2	30.0520	0.8803	0.3499	n.s.
ACT - T2	23.1285	1.3633	0.2452	n.s.
EVL - F2	553.7841	1.1736	0.2808	n.s.
POT - F2	226.7379	5.3656	0.0222	*
ACT - F2	14.1801	0.8010	0.3725	n.s.

* = Significant (P=.05)

n.s. = Non-Significant

The Effects of Justification:

The third hypothesis of this investigation was related to determining if the degree of verbal justification given subjects for engaging in a belief discrepant behavior had any effect on a proposed change of attitude. A summary table of the univariate analysis of low justification vs control and high justification vs control is presented in Table 11. No statistically significant differences are found in Table 11, and the null hypothesis related to justification could not be rejected.

Interaction Effects:

Interaction effects were also assessed through univariate analysis. Summary tables of interaction effects are presented in Tables 12, 13, 14, and 15.

TABLE 11

SUMMARY TABLE OF ANALYSIS OF LOW JUSTIFICATION VS CONTROL
AND HIGH JUSTIFICATION VS CONTROL
(2 df for Hypothesis)
(127 df for Error)

Variable Post-Test Measure	Between Mean Square	Univariate F	P Less Than	
EVL - T2	154.5018	0.4180	0.6593	n.s.
POT - T2	22.1179	0.6479	0.5249	n.s.
ACT - T2	8.9111	0.5252	0.5927	n.s.
EVL - F2	453.6161	0.9614	0.3852	n.s.
POT - F2	14.9056	0.3527	0.7035	n.s.
ACT - F2	21.5912	1.2197	0.2988	n.s.

* = Significant (P=.05)

n.s. = Non-Significant

TABLE 12

SUMMARY TABLE OF ANALYSIS OF PRIOR COMMITMENT
X JUSTIFICATION INTERACTION
(2 df for Hypothesis)
(127 df for Error)

Variable Post-Test Measure	Between Mean Square	Univariate F	P Less Than	
EVL - T2	17.2530	0.0467	0.9545	n.s.
POT - T2	52.0564	1.5249	0.2216	n.s.
ACT - T2	4.5402	0.2676	0.7657	n.s.
EVL - F2	88.7612	0.1881	0.8288	n.s.
POT - F2	82.7875	1.9591	0.1453	n.s.
ACT - F2	19.3406	1.0925	0.3385	n.s.

* = Significant (P=.05)

n.s. = Non-Significant

TABLE 13

SUMMARY TABLE OF ANALYSIS OF PRIOR COMMITMENT
X COMMITMENT INTERACTION
(1 df for Hypothesis)
(127 df for Error)

Variable Post-Test Measure	Between Mean Square	Univariate F	P Less Than	
EVL - T2	147.5498	0.3992	0.5287	n.s.
POT - T2	80.4979	2.3580	0.1272	n.s.
ACT - T2	16.9448	0.9988	0.3196	n.s.
EVL - F2	1452.3608	3.0780	0.0818	n.s.
POT - F2	330.1185	7.8121	0.0060	*
ACT - F2	0.2159	0.0122	0.9123	n.s.

* = Significant (P=.05)
n.s. = Non-Significant

TABLE 14

SUMMARY TABLE OF ANALYSIS OF JUSTIFICATION
X COMMITMENT INTERACTION
(2 df for Hypothesis)
(127 df for Error)

Variable Post-Test Measure	Between Mean Square	Univariate F	P Less Than	
EVL - T2	646.8034	1.7499	0.1780	n.s.
POT - T2	8.2731	0.2423	0.7852	n.s.
ACT - T2	18.8797	1.1128	0.3319	n.s.
EVL - F2	514.1384	1.0896	0.3395	n.s.
POT - F2	52.1476	1.2340	0.2946	n.s.
ACT - F2	12.9634	0.7323	0.4829	n.s.

* = Significant (P=.05)
n.s. = Non-Significant

TABLE 15

SUMMARY TABLE OF ANALYSIS OF PRIOR COMMITMENT
X JUSTIFICATION X COMMITMENT INTERACTION
(2 df for Hypothesis)
(127 df for Error)

Variable Post-Test Measure	Between Mean Square	Univariate F	P Less Than	
EVL - T2	236.0958	0.6388	0.5297	n.s.
POT - T2	76.8182	2.2503	0.1096	n.s.
ACT - T2	17.0351	1.0041	0.3693	n.s.
EVL - F2	799.3436	1.6941	0.1879	n.s.
POT - F2	153.0129	3.6210	0.0296	*
ACT - F2	25.9137	1.4639	0.2353	n.s.

* = Significant (P=.05)
n.s. = Non-Significant

The only statistically significant interaction effects were found twice on the potency scale, but only on the concept related to fees. The two statistically significant interaction effects were related to prior commitment x justification interaction and prior commitment x commitment interaction.

III. Discussion

The statistical results of this investigation failed to support any of the three hypotheses of the investigation. The first hypothesis predicted that a change in attitude could be induced and be explained by dissonance in subjects who have a high degree of prior commitment about an issue. The failure of the data to support the hypothesis could be explained by assimilation-contrast theory. Assimilation-contrast theorists (social judgment-involvement approach theorists) predict that the more involved the subject is in his stand, the less likely he is to

change his attitudes. Those using the social judgment-involvement approach expect that a great discrepancy between one's own position and that advocated in a contrary communication or role will result in little or no attitude change.

In a speculative manner it is possible to explain the results of the data in terms of dissonance theory. As dissonance reduction can be accomplished by means other than a change of attitude, other avenues of dissonance reduction must be reviewed. On the basis of the analysis of the outlines of the speeches prepared by subjects from both low prior commitment and high prior commitment groups in a high justification and low commitment situation, another form of dissonance reduction is plausible. Subjects in the forced compliance situation reduced dissonance by creating arguments that were really in line with their own personal beliefs but yet fulfilled the requirements of the forced compliance situation. In brief, arguments made were in support of high non-resident tuition and fees but were stated in such a manner that little or no dissonance would be created for the individual opposing high non-resident tuition and fees. The following quotes from two subjects in the high justification and low commitment situation are exemplary of such a proposed mode of dissonance reduction:

> High out-of-state tuition will keep a lot of trouble-making Eastern slobs out of the great Wisconsin educational system. Their ideas and beliefs are too radical for the simple-minded idiots of the Midwest, and by keeping these communists out, the State Universities will be able to do as they wish without fear of student unrest.

Another example of such an approach is seen in a second subject's outline:

I High tuition is good because it puts out of state students in poverty.

A. It forces one to hold two jobs.
B. It cuts down on student consumer spending.

II High tuition is good because it forces down student enrollment and makes dorms that could be used to house students shut down.

A. It's good because it cuts down funds necessary to run the school.
B. . . .[1]

Other subjects in this experimental group, not using a similar approach, frequently used arguments that were originally released in the mass media as explanation for the dramatic increase in non-resident tuition and fees. It had been previously established that such arguments were not acceptable to the majority of the subjects.

The data related to the first hypothesis is supportive of the position taken by social judgment-involvement theorists, but other forms of evidence do not exclude a dissonance interpretation of the results of the investigation.

The second hypothesis was to explore if a variation of commitment (amount of supposed public exposure) would affect the degree of proposed attitude change. Although in the univariate analyses there are isolated cases of significantly different data concerning the commitment variable, no main effect or clear interaction effects for commitment were discovered. As a result of the lack of statistical significance, the null hypothesis could not be rejected.

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[1]These quotes are from the original outlines prepared by subjects in one of the experimental groups of this investigation.

The third hypothesis predicted that the degree of proposed attitude change would not be the same for subjects receiving high verbal justification and subjects receiving a lesser amount of verbal justification for engaging in a belief discrepant behavior. The data failed to support a rejection of the third null hypothesis . The failure of the data to support the third hypothesis can be explained in one or more ways. One interpretation of the data would be that neither level of justification was sufficient to justify a significant change, nor was the justification adequate to arouse dissonance. Another interpretation would be that both levels of justification were too large to arouse dissonance but insufficient to justify a change of attitude from the standpoint of the social judgment-involvement approach. On the basis of the debriefing sessions and selective follow-up interviews, a probable speculation is that subjects felt a tension that might be described as dissonance; but, if in fact they did have dissonance, a means of dissonance reduction other than a change of attitude was used, and the role of justification became insignificant. Unfortunately, no measure of the subjects perception of the magnitude of justification was made, and any interpretation of data related to justification must be speculative.

IV. A Summary

This investigation was centered upon the ability of dissonance to induce and to explain a change of attitude in subjects with a high degree of prior commitment about an issue. The effects of commitment and justification were also studied to determine if they contributed to the proposed change of attitude. Data gathered from pre-test and post-test

semantic differential scores were analyzed with multivariate analysis of covariance and univariate analysis techniques. Significance tests were made on:

1. low prior commitment vs high prior commitment
2. low justification vs control and high justification vs control
3. low commitment vs high commitment
4. prior commitment x justification interaction
5. prior commitment x commitment interaction
6. justification x commitment interaction
7. prior commitment x justification x commitment interaction

The multivariate analysis of covariance did not yield any statistically significant results. The univariate analysis was justified on the basis of the independence of the varied scales of the semantic differential and produced isolated instances of significantly different data, for example, $P = 0.0222$ on the potency scale for the post-test on the concept related to fees. On the basis of the statistical evidence accumulated, it was not possible to reject any of the three null hypotheses related to either a change of attitude being induced and explained by dissonance in subjects with high prior commitment about an issue, or a difference in degree of proposed attitude change as a result of varied amounts of commitment (proposed public exposure), or a difference in degree of proposed attitude change as a result of varied levels of verbal justification for engaging in a belief discrepant behavior.

The failure of the data to support any of the three alternate hypotheses could be explained from the position of the social judgment-

involvement approach theorists. They expect that a great discrepancy between one's own position and that advocated in a contrary communication or role will result in little or no attitude change. In a speculative manner the results of the investigation could be explained by subjects finding an alternate means other than a change of attitude for dissonance reduction. Examples were given in this chapter of such possible forms of dissonance reduction.

Regardless of the acceptance of either of the two explanations for the failure to create and explain a change of attitude by dissonance, the two alternate hypotheses related to commitment and justification could not be proven by the data of this investigation. A lack of a main effect for justification could be explained by subjects selecting an alternate means of dissonance reduction other than a change of attitude, thus reducing the importance of the justification variable. From the standpoint of the social judgment-involvement approach theorists, the lack of a main effect for justification could be explained by indicating that the amount of justification was insufficient to produce anything of significance.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this investigation was to determine if a change of attitude could be induced and explained by dissonance in subjects with high prior commitment about an issue. The primary questions considered in the study were:

1. Can a change of attitude be induced and explained by dissonance in subjects who have a high degree of prior commitment?
2. When engaging in an act which is discrepant with one's private beliefs, does a high commitment situation (proposed-televised-publicly identified use of statements) or a low commitment situation (proposed-anonymous-non video recorded use of statements) result in the subjects having a greater change of attitude?
3. Does more or less verbal justification for subjects engaging in a discrepant behavior result in greater attitude change?

A review of related literature was made. Emphasis was placed on the writings of dissonance theorists and theorists using the social judgment-involvement approach to attitude change. The contrasts in the literature related to the two theories made the possible results of the investigation more speculative. It was clear that neither dissonance theory nor the theory related to the social judgment-

involvement approach to attitude change could be ignored in the interpretation of the results of this investigation.

I. Procedures of the Study

The subjects in this investigation were 145 students at Wisconsin State University-Superior. The University, just prior to the beginning of the 1969-70 school year, had to implement a dramatic increase in non-resident tuition and fees. Although evidence led to the conclusion that most students had strong feelings about the tuition and fee increase, on an arbitrary basis resident and non-resident students were respectively designated as having either low prior commitment or high prior commitment.

All the subjects designated as having either low prior commitment or high prior commitment were assigned either to one of the experimental groups where they were forced to participate in a belief discrepant behavior or to control groups which did not perform a belief discrepant behavior. The experimental and control group subjects were placed in a high commitment situation (proposed-televised-publicly identified use of the statements) or in a low commitment situation (proposed-anonymous-non video recorded use of the statements). The subjects in the experimental groups were given one of two levels of verbal justification for participating in the belief discrepant behavior. Subjects in the control situations were given one level of justification. A semantic differential was administered in a pre-test and post-test situation. A multivariate analysis of covariance and a univariate analysis were used in analyzing the resulting data. The basic design of the investigation was a 2 x 3 x 2 factorial design.

II. Summary of Findings

Data gathered from pre-test and post-test semantic differential scores were analyzed with multivariate analysis of covariance and univariate analysis techniques. Significance tests were made on:

1. low prior commitment vs high prior commitment
2. low justification vs control and high justification vs control
3. low commitment vs high commitment
4. prior commitment x justification interaction
5. prior commitment x commitment interaction
6. justification x commitment interaction
7. prior commitment x justification x commitment interaction

The multivariate analysis of covariance did not yield any statistically significant results; however, the univariate analysis produced some statistically significant results, but not in any consistent manner. On the basis of the statistical evidence accumulated, none of the three null hypotheses related to this investigation could be rejected.

III. Conclusions

The failure of the data to support the first hypothesis of this investigation, which was related to the ability of dissonance to induce and explain a change of attitude in subjects with a high degree of prior commitment, would be conducive to interpretation from the theoretical position of the social judgment-involvement approach to attitude change. The data from this investigation in large supports the findings of Rand in his empirical comparison of the social

judgment-involvement approach and dissonance theory.[1] A speculative explanation for the failure of the data to warrant rejection of the first null hypothesis can be found in dissonance theory. As dissonance can be reduced by means other than a change of attitude, it can be suggested that an alternate form of dissonance reduction was chosen by the subjects. A review of some of the experimental subjects' speech outlines indicates that some subjects did reduce dissonance by slanting their outlines in such a manner as to reduce their dissonant situations.

No main effects or clear interaction effects for either commitment or justification were found. The data related to the second and third hypotheses of this investigation did not allow for the rejection of either the second or third null hypotheses.

The failure to confirm the alternate hypotheses of this study could not be attributed to the measuring instrument. The high correlations of evaluative scales with evaluative scales, potency scales with potency scales, and activity scales with activity scales indicated the reliability of the semantic differential used in this investigation. The independence of the semantic differential scales was demonstrated by the low correlations between such scales as the evaluative scale and the activity scale. In general the data from this investigation demonstrated the suitability of the semantic differential as a research tool for studies of this type.

No generalizations related to the hypotheses of this investigation appear valid. Although the data does support the position taken

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[1]Rand, op. cit., p. 112801129-A.

by social judgment-involvement theorists, alternative dissonance explanations are plausible and further research is suggested.

IV. Implications for Further Research

On the basis of the limitations and conclusions of this study, research in the following specific areas is warranted:

1. A further investigation with appropriate controls for alternate modes of dissonance reduction to determine if dissonance can induce and can explain attitude change in subjects with what has been labeled as a high degree of prior commitment in this study.
2. An investigation to determine the nature of verbal justification as perceived by the experimental subject.
3. A thorough study of the impact of role playing on producing long-term changes of attitude.

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APPENDICES

APPENDIX A

THE SEMANTIC DIFFERENTIAL EMPLOYED IN THIS INVESTIGATION

Your Name

INSTRUCTIONS

The purpose of this study is to measure the meanings of certain things to various people by having them judge them against a series of descriptive scales. In taking this test, please make your judgments on the basis of what these things mean to you. On each page of this booklet, you will find a different concept to be judged and beneath it a set of scales. You are to rate the concept on each of these scales in order.

Here is how you are to use these scales:

If you feel that the concept at the top of the page is very closely related to one end of the scale, you should place your check-mark as follows:

good X : ___ : ___ : ___ : ___ : ___ : ___ bad

or

good ___ : ___ : ___ : ___ : ___ : ___ : X bad

If you feel that the concept is quite closely related to one or the other end of the scale (but not extremely), you should place your check-mark as follows:

rugged ___ : X : ___ : ___ : ___ : ___ : ___ delicate

or

rugged ___ : ___ : ___ : ___ : ___ : X : ___ delicate

If the concept seems only slightly related to one side as opposed to the other side (but is not really neutral), you should check as follows:

hot ___ : ___ : X : ___ : ___ : ___ : ___ cold

or

hot ___ : ___ : ___ : ___ : X : ___ : ___ cold

The direction toward which you check, of course, depends upon which of the two ends of the scale seems most characteristic of the thing you're judging.

If you consider the concept to be neutral on the scale, both sides of the scale equally associated with the concept, or if the scale is completely irrelevant, unrelated to the concept, then you should place your check-mark in the middle space:

bass ___ : ___ : ___ : X : ___ : ___ : ___ treble

INSTRUCTIONS (Continued)

IMPORTANT: (1) Please your check-marks in the middle of the space, not on the boundaries:

____:____:____:_X_:____:____:____

(2) Be sure you check every scale for every concept--DO NOT OMIT ANY.

(3) Never put more than one check-mark on a single scale.

Sometimes you may feel as though you've had the same item before on the test. This will not be the case, so do not look back and forth through the items. Do not try to remember how you checked similar items earlier on the test. Make each item a separate and independent judgment. Work at a fairly high speed through this test. Do not worry or puzzle over individual items. It is your first impressions, the immediate "feelings" about the items, that we want. On the other hand, please do not be careless, because we want your true impressions.

NOTE: THERE ARE NO "RIGHT" OR "WRONG" ANSWERS--WE WANT YOUR FIRST IMPRESSIONS.

HIGH NON-RESIDENT TUITION

good	____:____:____:____:____:____:____	bad
small	____:____:____:____:____:____:____	large
ugly	____:____:____:____:____:____:____	beautiful
hard	____:____:____:____:____:____:____	soft
sour	____:____:____:____:____:____:____	sweet
weak	____:____:____:____:____:____:____	strong
dirty	____:____:____:____:____:____:____	clean
low	____:____:____:____:____:____:____	high
agitated	____:____:____:____:____:____:____	calm
tasty	____:____:____:____:____:____:____	distasteful
valuable	____:____:____:____:____:____:____	worthless
green	____:____:____:____:____:____:____	red
kind	____:____:____:____:____:____:____	cruel
loud	____:____:____:____:____:____:____	soft
deep	____:____:____:____:____:____:____	shallow
unpleasant	____:____:____:____:____:____:____	pleasant

HIGH NON-RESIDENT TUITION
Page 2

black	___:___:___:___:___:___:___	white
bitter	___:___:___:___:___:___:___	sweet
sad	___:___:___:___:___:___:___	happy
dull	___:___:___:___:___:___:___	sharp
full	___:___:___:___:___:___:___	empty
peaceful	___:___:___:___:___:___:___	ferocious
heavy	___:___:___:___:___:___:___	light
sacred	___:___:___:___:___:___:___	profane
relaxed	___:___:___:___:___:___:___	tense
cowardly	___:___:___:___:___:___:___	brave
poor	___:___:___:___:___:___:___	rich
clear	___:___:___:___:___:___:___	hazy
hot	___:___:___:___:___:___:___	cold
thick	___:___:___:___:___:___:___	thin
awful	___:___:___:___:___:___:___	nice
dark	___:___:___:___:___:___:___	bright
bass	___:___:___:___:___:___:___	treble

HIGH NON-RESIDENT TUITION
Page 3

rounded	___:___:___:___:___:___:___	angular
fragrant	___:___:___:___:___:___:___	foul
honest	___:___:___:___:___:___:___	dishonest
active	___:___:___:___:___:___:___	passive
smooth	___:___:___:___:___:___:___	rough
fresh	___:___:___:___:___:___:___	stale
fast	___:___:___:___:___:___:___	slow
unfair	___:___:___:___:___:___:___	fair
rugged	___:___:___:___:___:___:___	delicate
far	___:___:___:___:___:___:___	near
sick	___:___:___:___:___:___:___	healthy
narrow	___:___:___:___:___:___:___	wide

INCREASED FEES FOR NON-RESIDENT STUDENTS

bad	____:____:____:____:____:____:____	good
large	____:____:____:____:____:____:____	small
beautiful	____:____:____:____:____:____:____	ugly
soft	____:____:____:____:____:____:____	hard
sour	____:____:____:____:____:____:____	sweet
weak	____:____:____:____:____:____:____	strong
dirty	____:____:____:____:____:____:____	clean
low	____:____:____:____:____:____:____	high
calm	____:____:____:____:____:____:____	agitated
distasteful	____:____:____:____:____:____:____	tasty
valuable	____:____:____:____:____:____:____	worthless
green	____:____:____:____:____:____:____	red
kind	____:____:____:____:____:____:____	cruel
soft	____:____:____:____:____:____:____	loud
deep	____:____:____:____:____:____:____	shallow
unpleasant	____:____:____:____:____:____:____	pleasant

INCREASED FEES FOR NON-RESIDENT STUDENTS
Page 2

black	____:____:____:____:____:____:____	white
bitter	____:____:____:____:____:____:____	sweet
sad	____:____:____:____:____:____:____	happy
sharp	____:____:____:____:____:____:____	dull
empty	____:____:____:____:____:____:____	full
peaceful	____:____:____:____:____:____:____	ferocious
heavy	____:____:____:____:____:____:____	light
profane	____:____:____:____:____:____:____	sacred
tense	____:____:____:____:____:____:____	relaxed
brave	____:____:____:____:____:____:____	cowardly
poor	____:____:____:____:____:____:____	rich
hazy	____:____:____:____:____:____:____	clear
cold	____:____:____:____:____:____:____	hot
thin	____:____:____:____:____:____:____	thick
nice	____:____:____:____:____:____:____	awful
bright	____:____:____:____:____:____:____	dark
treble	____:____:____:____:____:____:____	bass

INCREASED FEES FOR NON-RESIDENT STUDENTS
Page 3

angular	____:____:____:____:____:____:____	rounded
foul	____:____:____:____:____:____:____	fragrant
honest	____:____:____:____:____:____:____	dishonest
active	____:____:____:____:____:____:____	passive
rough	____:____:____:____:____:____:____	smooth
stale	____:____:____:____:____:____:____	fresh
fast	____:____:____:____:____:____:____	slow
unfair	____:____:____:____:____:____:____	fair
rugged	____:____:____:____:____:____:____	delicate
far	____:____:____:____:____:____:____	near
healthy	____:____:____:____:____:____:____	sick
narrow	____:____:____:____:____:____:____	wide

APPENDIX B

DIRECTIONS GIVEN TO THE EXPERIMENTAL AND CONTROL GROUPS

PRE-TEST INFORMATION

One of the graduate students is compiling statistical data on the basis of the semantic differential. He has asked me if you would be willing to fill out these forms to assist him in the statistical project. Your name is not needed, as this information will be used only for a statistical exercise. However, it would be appreciated if you would put your social security number in the space provided for your name. These statistics will be analyzed on the computer, which has a program based on social security numbers. This should only take you a short length of time and will be of some assistance to the graduate student.

DIRECTIONS FOR SUBJECTS WITH LOW JUSTIFICATION AND HIGH COMMITMENT
(IDENTIFYING TELEVISED USE OF STATEMENTS PUBLICLY)

One of our graduate students is doing a study of the logic used by a given group. He has asked us to make a video-tape for use over university closed-circuit television and possibly over the local educational television station. Other classes will be asked to record in a similar situation except over the radio.

The graduate student has asked to have each of you prepare a three-minute speech supporting high non-resident tuition for state universities. It does not matter whether or not you believe in high non-resident tuition; he is interested only in illustrating the logic used by a given group. In other words, he wants you to formulate the best possible argument you can in support of a high non-resident tuition.

I will give you 20 minutes to outline your speech and the arguments pertinent to your speech. Please do it on this paper and sign your name in the upper right-hand corner. Prior to starting your writing we would like to focus the camera on each of you, so that we may test the television equipment. Please look at the monitor. At a later date you will be expected to record the speeches on video-tape at the television studio. For the purposes of the demonstration it will be necessary that you identify yourself and make your speech as forceful as possible. Those people who will see your speech will assume that you believe what you say.

You do not have to participate if you choose not to do so; however, the student does need your help, and this project should not take over 35 minutes of our time today.

Just prior to class time, one of the members associated with the experiment indicated that you may keep the outline of your speech until you are contacted to make the recording. Apparently they will be contacting you just as you leave class or in the very near future. I have been informed that the recording will be arranged at your convenience.

DIRECTIONS FOR SUBJECTS WITH LOW JUSTIFICATION AND LOW COMMITMENT
(ANONYMOUS USE OF STATEMENTS PUBLICLY)

One of our graduate students is doing a study of the logic used by a given group. He has asked us to participate in an anonymous recording for use over the university radio station and in individual classrooms. Other classes will be asked to record in a similar situation except over closed-circuit television.

The graduate student has asked to have each of you prepare a three-minute speech supporting high non-resident tuition for state universities. It does not matter whether or not you believe in high non-resident tuition; he is interested only in illustrating the logic used by a given professional group. In other words, he wants you to formulate the best possible argument you can in support of a high non-resident tuition.

I will give you 20 minutes to outline your speech and the arguments pertinent to your speech. Please do it on this paper and sign your name in the upper right-hand corner. The student making this study will randomly select most of you to go up to the radio station to record your speech. Please do not be concerned about signing your name. Once the random selections have been made, you will no longer be identified as an individual. The name is merely to identify you so that you may be requested to come and record your speech. Your speech will then be further edited and spliced, so that any possibility of your being identified as an individual is non-existent.

You do not have to participate if you choose not to do so; however, the student does need your help, and this project should not take over 35 minutes of our time today.

Just prior to class time, one of the members associated with the experiment indicated that you may keep the outline of your speech until you are contacted to make the recording. Apparently they will be contacting you just as you leave the class or in the very near future. Also, I have been informed that the recording will be arranged at your convenience.

DIRECTIONS FOR SUBJECTS WITH HIGH JUSTIFICATION AND HIGH COMMITMENT
(IDENTIFYING TELEVISED USE OF STATEMENTS PUBLICLY)

A member of the staff and some of his students are involved in a research project. They have asked us to make a video-tape for use over university closed-circuit television and possibly over the local educational television station. Other classes will be asked to record in a similar situation except over the radio.

The staff member and students have chosen to have each of you prepare a three-minute speech supporting high non-resident tuition for state universities. It does not matter whether or not you believe in high non-resident tuition; they are interested only in selecting certain statements from your speeches to demonstrate the logic used by a given group. In other words, they want you to formulate the best possible argument you can in support of high non-resident tuition.

I will give you 20 minutes to outline your speech and the arguments pertinent to your speech. Please do it on this paper and sign your name in the upper right-hand corner. Prior to starting your writing, we would like to focus the camera on each of you. Please look at the monitor. At a later date you will be expected to record the speeches on video-tape at the television studio. For the purposes of the demonstration, it will be necessary that you identify yourself and make your speech as forceful as possible. Those people who will see your speech will assume that you believe what you say.

You do not have to participate if you choose not to do so; however, I would like to encourage you to consider the project. It is being done by one of our staff members in conjunction with some of his students for a rather well-known organization. They hope to produce both the televised and the audio recordings into a demonstration model to be used in classes throughout the country for problem solving and other logic oriented projects. Also, it would appear that as a result of this project, they will be able to gather some new information about how one structures his mind in a cognitive sense. If the group doing the project is able to produce the results they expect, your time will be well spent because your efforts will lead to new knowledge in cognitive structure, as well as to the development of a major learning unit.

DIRECTIONS FOR SUBJECTS WITH HIGH JUSTIFICATION AND HIGH COMMITMENT
(IDENTIFYING TELEVISED USE OF STATEMENTS PUBLICLY)
Page 2

Just prior to class time, one of the members associated with the experiment indicated that you may keep the outline of your speech until you are contacted to make the recording. Apparently they will be contacting you just as you leave class or in the very near future. Also, I have been informed that the recording will be arranged at your convenience.

DIRECTIONS FOR SUBJECTS WITH HIGH JUSTIFICATION AND LOW COMMITMENT
(ANONYMOUS USE OF STATEMENTS PUBLICLY)

A member of the staff and some of his students have asked us to participate in an anonymous recording for use over the university radio station and in individual classrooms for the purpose of studying the logic used by a given group. Other classes will be asked to record in a similar situation except over closed-circuit television.

The staff member and students have chosen to have each of you prepare a three-minute speech supporting high non-resident tuition for state universities. It does not matter whether or not you believe in high non-resident tuition; they are interested only in selecting certain statements from your speeches to demonstrate the logic used by a given group. In other words, they want you to formulate the best argument you can for high non-resident tuition.

I will give you 20 minutes to outline the speech and the arguments pertinent to your speech. Please do it on this paper and sign your name in the upper right-hand corner. Those making this study will randomly select most of you to go up to the radio station to record your speech. Please do not be concerned about signing your name. The name is merely to identify you so that they may request that you come and record your speech. Your speech will then be further edited and spliced so that any possibility of your being identified with the speech is non-existent.

You do not have to participate if you choose not to do so; however, I would like to encourage you to consider the project. It is being done by one of our staff members in conjunction with some of his students for a rather well-known organization. They hope to produce both the televised and the audio recordings into a demonstration model to be used in classes throughout the country for problem solving and other logic oriented projects. Also, it would appear that as a result of this project, they will be able to gather some new information about how one structures his mind in a cognitive sense. If the group doing the project is able to produce the results they expect, your time will be well spent because your efforts will lead to new knowledge in cognitive structure, as well as to the development of a major learning unit.

DIRECTIONS FOR SUBJECTS WITH HIGH JUSTIFICATION AND LOW COMMITMENT
(ANONYMOUS USE OF STATEMENTS PUBLICLY)
Page 2

Just prior to class time, one of the members associated with the experiment indicated that you may keep the outline of your speech until you are contacted to make the recording. Apparently they will be contacting you just as you leave class or in the very near future. Also, I have been informed that the recording will be arranged at your convenience.

DIRECTIONS FOR CONTROL GROUP

An experiment is being conducted to study cognitive structure, as well as the logic used by a given group. The following have been randomly selected to make an anonymous radio recording:

XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX

The remainder of you are asked to participate in an identified television recording. The people doing the survey would like to have each of you prepare a three-minute speech either supporting or opposing high tuition and fees for non-resident students in Wisconsin institutions of higher education.

I will give you 20 minutes to outline your speech and the arguments pertinent to it. Please organize your speech on this paper and sign your name in the upper right-hand corner.

Remember that you may either oppose or support high non-resident tuition and fees, i.e., argue from your own point of view. At a later time you will be requested to record your speech.

You do not have to participate in the experiment if you choose not to do so; however, your efforts will be greatly appreciated and ultimately very useful.

Those of you who are to be televised should now stand up one at a time, so that we can determine the best camera angles to use when your speech is actually recorded.

Just prior to class time, one of the members associated with the experiment indicated that you may keep the outline of your speech until you are contacted to make the recording. Apparently they will be contacting you just as you leave class or in the very near future. Also, I have been informed that the recording will be arranged at your convenience.

POST-TEST INFORMATION

I have another favor to ask of all of you. You have just taken time in preparation for engaging in a publicly televised speech (anonymously recorded radio speech). Previously, I had asked you to help one of our graduate students in a statistical project. Unfortunately, after the data was placed on the computer, the tapes were erased and all data was lost. He has asked us to fill out the semantic differential again. As we have already lost some of our class time, we might as well assist the fellow in his project. However, this time if he has problems with losing his data, we will ask him to collect it in another class.

APPENDIX C

A DESCRIPTION OF THE FORTRAN IV PROGRAM DEVELOPED BY JEREMY FINN AND MODIFIED BY DAVID WRIGHT

Jeremy D. Finn's Multivariance -

Univariate and Multivariate Analysis of Variance and Covariance: A FORTRAN IV Program

Occasional Paper No. 89

Office of Research Consultation

School for Advanced Studies

College of Education

Michigan State University

March 1970

Multivariance - Version 4 June 1968 by

Jeremy D. Finn, Department of Educational Psychology, State University of New York at Buffalo

Modified for the Michigan State University CDC 3600 and 6500 computer systems by David J. Wright, Office of Research Consultation.

This description contains excerpts from the complete Multivariance documentation by Jeremy Finn, available on a limited basis at the Office of Research Consultation, 201 Erickson Hall. For ease in cross reference, page numbers and references are the same in both documents.

TABLE OF CONTENTS

A Generalized Univariate and Multivariate Analysis of Variance, Covariance, and Regression Program[1]

This and the following chapters describe a computer program which is now in operation at the State University of New York at Buffalo, and elsewhere, which will perform much of the multivariate analysis reported in preceding sections. Multivariance will perform univariate and multivariate linear estimation and tests of hypotheses for any crossed and/or nested design, with or without concomitant variables. The number of observations in the subclasses may be equal, proportional, or disproportionate. The latter includes the extreme case of unequal group sizes involving null subclasses, such as might arise in the application of incomplete experimental designs.

The program performs an exact least-squares analysis by the method described by Bock (1963). It is logically divided into three phases: input, estimation, and what has been termed "analysis." The input phase allows for six possible forms of data, four controlled by variable format cards. The data may be punched as:

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[1]This chapter is a modified version of a paper by the same name presented at the annual meeting of SHARE (XXX), Houston, Texas, February 29, 1968.

The version of Multivariance presented in this manual was written and tested with the cooperation of the Computing Center of the State University of New York at Buffalo. The Center is partially supported by NIH Grant FR-00126 and NSF Grant GP-7318. Assistance with the programming of this version was provided by Mr. Fred Hockersmith. Several of the matrix subroutines were adopted and/or revised from those produced by the IBM Corporation (1966), and from Bock and Peterson (1967). The chi-square and F probability routines were written by Mr. Richard J. Sherin and appear in Clyde, Cramer, and Sherin (1966). Computations for the age x sex repeated measures design were performed by Mr. Roger Koehler.

1. Raw unsorted data, each observation with its own cell identification information.
2. Raw data, sorted by cells, each cell with its own header card.
3. Raw data, no header cards, in order by cells.

4, 5. Raw data to be read from an independently prepared binary tape.

6. Means, variance-covariance matrix, and cell frequencies.

The last option allows for reanalysis of data which may have been presented only in summary form, such as might be found in a text or journal article. The subclass frequencies may be highly unequal, and within the limits of the computer are not restricted in magnitude. No account need be made of null groups; the program will automatically detect them. Options are available for reading the data from non-system binary or BCD input devices.

A variety of common data transformations is provided. In addition, the program will accept a matrix transformation which can be used to obtain linear combinations of the original variates. The transformation matrix may itself be automatically generated, for the analysis of repeated measures designs. A program option allows for the orthonormalization of the transformation matrix. After transformations, the observed means and standard deviations for each subclass are displayed.

The estimation and analysis phases are based entirely on the specification of single-degree-of-freedom planned contrasts. Rather

than placing artificial restrictions on the sums of the group effects, Multivariance provides a solution for the model of deficient rank by having the user determine linear combinations of the group membership effects which are of interest to him. Five common sets of between-group contrasts are available, including orthogonal polynomials. Others include the comparison of all experimental groups to a control, comparing each subgroup to the mean of the subgroups, and Helmert contrasts. In addition, the program will accept arbitrary contrast matrices constructed by the user, for problems for which contrasts other than the five provided are of interest. The designation of the effects is through the use of coded "symbolic contrast vectors" which are described in the following sections.

The estimation phase of the program will estimate the magnitude of the effects and their standard errors. In addition, subclass means and residuals may be estimated, based upon the fitting of a model of user-determined rank. The observed and estimated subclass means may be combined across subclasses as desired. Means may be estimated for null subclasses when this is appropriate. The error sum of squares and cross products are estimated, and are adjusted to yield the variances and correlations of the variates. This estimate of the population sum-of-squares and cross-products may be either the within-group term, the residual sum-of-products after fitting a given model to the data, or special effects which are user-determined. This feature allows for the analysis of any fixed, random, or mixed effects design. Only one of the possible error terms may be employed

in any given run however, so that multiple runs are necessary for testing all effects in a model where more than one error term is needed.

The analysis phase may be repeated any number of times. It allows the user to select subsets of variables and covariates from his original input set and to perform the appropriate analyses. Designating more than one variable as a criterion measure will cause the program to consider them simultaneously and to apply appropriate multivariate test criteria. If some of the variables selected are designated as covariates, the program will perform a regression analysis prior to the analysis of covariance to determine the relationship between them and the dependent measures. The regression coefficients in raw and standardized form and their standard errors are estimated. If between-group contrasts, cell means, and residuals have been estimated, they will be adjusted for covariates and re-estimated. The partial correlations among the dependent measures, the adjusted variances and standard deviations, are calculated and displayed.

Tests of hypotheses concerning relationships between the two sets of variables are provided in three forms. The first of these is a univariate and step-down multiple correlation analysis, to determine the relationship between the independent variables and the individual dependent measures. Second, a stepwise univariate and multivariate multiple regression analysis is performed to determine the effects of the individual independent variables (or sets of independent variables; i.e. predictors may be entered into the

regression equations singly or in groups). In all cases, the order of both sets of variables is determined by the user prior to the computer run. A third regression option is the calculation of the canonical correlations, the corresponding raw and standardized weights, the percent of variation in the dependent measures accounted for by each of the correlations, and finally tests of significance of them. This is the extent of the regression portion of the Multivariance program. The program may be used to perform specific individual analyses. These include the simpler univariate analysis, the estimation of between-group effects, multivariate regression analysis, or just canonical correlation analysis by itself.

If subjects have been grouped in a sampling design, the program will proceed with the appropriate orthogonal or exact non-orthogonal analysis of variance (or covariance, if covariates had been indicated). The contrasts established earlier are grouped for tests of hypotheses according to the user's desires. For each contrast or each factor in the model, the program will perform univariate and/or multivariate tests of significance, and the step-down analysis. This latter feature is of particular value for the analysis of repeated measures designs.

If the user desires, a discriminant analysis may be performed for each contrast or set of contrasts. The variance of the discriminant function and the percentage of between-group variation attributable to it are computed by the program. In addition, the raw and standardized discriminant function weights are calculated,

and the three tests of significance due to Roy, Hotelling, and Bartlett, are carried out.

Finally, if the program is being employed to analyze a non-orthogonal design, the user may wish to reorder the between-group effects for subsequent hypothesis testing. Again the order must be determined by the user on an a priori basis. The program will easily allow for this reordering. An additional feature is of value for the analysis of incomplete designs. It often happens that in a complex design, or even simple designs which are based on survey data, a number of subgroups have no observations. It is therefore necessary when choosing a set of contrasts to be certain that they are estimable. The inestimable terms are frequently interactions and often difficult to locate by inspection. The current version of the Multivariance program includes the identification and location of such terms so that they may be removed from the model by the user. An annotated list of the output available from Multivariance follows the user's manual.

The main program and all of its subroutines are coded in Fortran IV. Double precision is employed wherever accuracy may become a concern. Versions of the program will readily work on most 32K-word computers and larger. Instructions for adapting the program to a new system follow this manual. The programming technique which was used is somewhat unique. All labels, data, data matrices, intermediate, and final results are stored within a single singly-subscripted long vector within the program. Within this vector, all

data are packed. That is, there are no unused core locations between the rows or columns of the matrices of a particular problem-run. In addition, there are no unused locations between matrices. This necessitates that the address of every matrix and of its elements be variable and adjusted to the particular problem. Only the non-zero portions of triangular matrices and half of symmetric matrices are kept in storage. Both are stored in packed form by rows (i.e. a_{11}, a_{21}, a_{22}, a_{31}, a_{32}, a_{33}, a_{41}, etc.). Only the principle elements of diagonal matrices are used, and are stored in vector form (i.e. a_{11}, a_{22}, ..., a_{nn}). Matrix operations on large matrices, such as the orthonormalization of a potentially very large basis, are segmented so that only portions of the matrix reside in core at any one time. Elements corresponding to null subclasses are eliminated whenever possible.

The result of this "controlled storage mode" is that Multivariance has the flexibility to handle a variety of different sized problems. In each case, the amount of core needed is a function of the particular job. With all other parameters minimal (e.g. with 1 dependent variable), the program will accept problems of about 1000 subgroups of subjects, or, of about 100 dependent variables and covariates combined in a problem with very few subgroups (e.g. 1 or 2 groups, or in a regression analysis), with a 32K machine. A typical large problem would be about 100 cells and 20 variables. Multivariance is programmed in sections (not links) so that portions of it may be easily removed from core, allowing more space for the data vector, and thus for larger problems. There are no checks built into the

program for exceeding the available storage memory. Guidelines for determining capacity are provided however, following the user's manual. In addition a list of removable sections and the options they contain is provided.

This version of Multivariance has incorporated within it a set of about 50 checks for errors that may be made in attempting to use the program. The user is referred to an appropriate point in this manual, which describes the source of the error. The program has been tested on a large number of problems. Yet, "bugs" are inevitable. The author would greatly appreciate being notified of any error that is discovered.

PREPARATION OF PROBLEM RUN: The sequence of control cards and statistical data for a problem is listed in this section. Detailed instructions for preparing the control cards and statistical data are given in the following section.

ORDER OF INPUT DECK

A) Systems control cards

B) Program control cards and data, as described on pages 11-19.

Interim 3600 Control Cards

3600 systems control cards as of May 1, 1970 are:

1. PNC (Problem Number Card) supplied by computer laboratory
2. Job Card:

   7 9 J$B, prob no., FINN, mm.ss, last name, first name.
3. Equip Card:

   7 9 EQUIP, 41 = **, MT(1915)
4. Load Card:

   7 9 L$AD, 41
5. Run Card:

   7 9 RUN, mm.ss, 3000
6. Program control cards and data as described on pages 11-19.

ERRATA - May 1, 1970

The present version of FINN's Multivariance Program is somewhat more limited than the version described on the following pages. At this time the following restrictions apply:

Input Description Card

Col 28 o, blank, or 1 only, i.e., options 2 and 3 do not exist.

Cols 35-36 Logical Unit Number if data is on tape (binary BCD). Unit 8 is advised.

Cols 44, 48 These options do not exist at this time.

Estimation Specification Card

Col 44 Options 1, 2, and 3 do not exist

Means key Do not use!

Last Card of a Job

Columns 75-80 FINISH rather than CONTINUE in 60-67 or STØP in 60-63.

PROGRAM CONTROL CARDS AND DATA:

All necessary information is marked with *.

All else is optional.

All numbers are right adjusted.

The page numbers accompanying the description of each parameter tell where more detailed information may be found concerning the parameter's use.

PHASE I -
INPUT

Title Cards*

Card 1* Cols. 1-60
Card 2* Cols. 1-60 Alphameric Title (p. 21)

Input Description Card*

Cols. 1- 4* Number of variables in input set. (p. 22)

Cols. 7- 8* Number of factors in the design. (p. 22)

Col. 12* Data form. (p. 22)

- 1 = raw, subclass identification on each observation
- 2 = raw, with header cards, by cells
- 3 = raw, without header cards, by cells
- 4 = mean, frequency, variance-covariance summary data.
- 5 = Independently prepared binary tape, without header cards.
- 6 = Independently prepared binary tape, with header cards.

Col. 16* Number of variable format cards. Punch 0 for data forms 5 or 6. (p. 22)

Col. 20 1 if transformations; blank otherwise. Optional. (p. 23)

Cols. 21-24 Number of variables after transformations if different from columns 1-4. Optional. (p. 23)

Col. 28 Blank or zero for no transformation matrix. 1 if trans. mat. is to be read. 2 if trans. mat. is to be generated with Symbolic Contrast Vectors. 3 to orthonormalize a generated trans. mat. Optional. (p. 23)

Cols. 29-32 Number of variables after transformation matrix if different from columns 21-24. Optional. (p. 23)

Cols. 35-36 1 if data is on user-supplied magnetic tape on unit 8. Blank for standard (card) input. Optional. (p. 23)

Col. 40 1 to punch summary data, blank otherwise. Information will be printed whether or not this option is used. Optional. (p. 24)

Col. 44 0 or blank to rewind optional input tape before run. 1 to avoid prior rewind. Optional. (p. 24)

Col. 48 1 to suppress computation of each subgroup's standard deviations. Blank otherwise. Optional. (p. 24)

Factor Identification Card(s)* (p. 25)

6-character factor names followed by 4 digits giving number of levels for that factor. 8 factors per card. Up to 10 factors total.

Comments Cards. Optional. (p. 26)

Columns 1-80, comments as desired.
Maximum number = 300.

End-of-Comments Card* (p. 26)

Cols. 1- 6 FINISH

Variable Format Card(s)* (p. 27)

As required.

Describe: Cell identification (Integer), then dependent variables and covariates (Floating Point) for data form 1.

Dependent variables and covariates only for data forms 2 and 3.

Cell identification (Integer) and one row of matrix of means (Floating Point) for data form 4.

Transformation Cards. Optional (p. 28)

Cols. 1- 4 Location of resultant variable.

Cols. 7- 8 Transformation code.

Cols. 9-12 First variable to be transformed.

Cols. 13-16 Second variable to be transformed.

Cols. 17-20 Third variable to be transformed.

Cols. 21-30 Constant to be used in transformation, including decimal point.

1 Blank Card at end, if transformations are used.

Variable Label Cards* (p. 32)

6-column alphameric labels, 13 to a card, as many labels as variables after all transformations.

DATA*

Form 1 (p. 33)

Each observation on one or more cards, variables preceded by cell identification. Last observation completely blank.

Form 2 (p. 34)

For each cell:

a) Header card:

Cols. 1- 6 Number of observations in the cell (NØBS).

Cols. 7-10 Level on first factor named on Factor Identification Card.

Cols. 11-14 Level on second factor.

Cols. 15-18 Level on third factor.

etc.

b) Observations for that cell (exactly NØBS observations).

Last data card: 1 blank card (following observations of last cell).

Form 3 (p. 35)

a) Vector of cell frequencies. Format 13F6.0

b) All data cards, grouped by cells, in the same order as vector of frequencies. No headers. No end-of-data card.

Form 4 (p. 35)

a) Matrix of cell means, 1 row at a time, each row preceded by cell identification. Last: 1 completely blank row.

b) Vector of cell frequencies. Format 13F6.0.

c) Format card for within-cell variance-covariance matrix.

d) Pooled within-cell variance-covariance matrix, in packed form by rows.

Form 5 (p. 37)

Independently prepared binary tape. Total number of observations in columns 1-6 of a data card. Each observation preceded by a fixed point identification vector.

Form 6 (p. 38)

Independently prepared binary tape. Observations grouped by cells. Header cards in data deck. Last header card blank.

Transformation Matrix. Optional. (p. 39)

If column 28 of Input Description Card is 1

a) Variable format card describing 1 row of the matrix.

b) Matrix, one row at a time, as many rows as variables after the matrix is applied, each with as many elements as variables before the matrix is applied.

If column 28 of Input Description Card is 2 or 3

a) Design Card
Cols 1-4 Number of factors in design on dependent vars.
Cols 5-8 Number of levels of first factor
Cols 9-12 Number of levels of second factor
Cols 13-16 etc.

(If any "number of levels" is negative, orthogonal polynomials may be used for that factor.)

Col. 48 1 to print original basis vectors as produced. Blank or zero otherwise.

b) As many Symbolic Contrast Vectors as number of variables after transformation matrix.

PHASE II - ESTIMATION: Estimation Specification Card*

Cols. 1- 4* Rank of model for significance testing. Number of contrasts to be entered. (p. 41)

Cols. 5- 8 Rank of model for estimation--not to exceed the rank of model for significance testing. (p. 42)

Col. 12* Error term for analysis of variance. (p. 43)

Blank or zero = Within-cell.

1 = Residual.

2 = Special effects.

Cols. 13-16 Degrees of freedom for error, if special effects are used - if column 12 = 2. Optional. (p. 44)

Cols. 17-20 Number of alternative orders of effects to be established - other than the first. Optional. (p. 44)

Cols. 23-24 Number of factors in the design for which arbitrary contrasts will be used Optional. (p. 44)

Cols. 27-28 Number of factors in the design for which orthogonal polynomials will be used. Optional. (p. 45)

Col. 32 1 to have estimated cell means and residuals calculated and printed. Blank otherwise. Optional. (p. 45)

Col. 36 1 to have variance-covariance factors and correlations among the estimates calculated and printed. Blank otherwise. Optional. (p. 45)

Col. 40 1 to have basis vectors printed. Blank otherwise. Optional. (p. 45)

Col. 44 Zero or blank for no combined means. 1 to have combined observed means and N's printed. 2 to have combined estimated means printed. 3 for both observed and estimated combined means. (For 1, 2, or 3 here, the following card must be a Means Key.) Optional. (p. 46)

Means Key. Optional. (p. 47)

Numeric codes indicating which factors and interactions are to have means combined across levels and displayed. Codes separated by commas, ended with period. Comments following period. Free format. Any number of cards.

Arbitrary Contrast Matrices. Optional. (p. 49)

a) Factor name card, columns 1-6 as on Factor Identification Card.

b) Variable format describing 1 row of contrast matrix.

c) Contrast matrix, 1 row at a time. Each row contains n elements, where n is the number of subclasses for that factor. There are n-1 such rows.

Orthogonal Polynomials. Optional. (p. 50)

Factor name card, columns 1-6 as on Factor Identification Card.

Symbolic Contrast Vectors* (p. 51)

Optional if only regression analysis is desired.

As many cards, or equivalent, as rank of the model for significance testing. Each SCV should indicate one or more complete contrasts involving all factors, even if only their grand means, and should have a contrast description. If there is no contrast label in columns 75-80, the first six non-blank characters following the contrast code will be used as the label.

Basis Reordering Keys. Optional. (p. 59)

As many keys as indicated in columns 17-20 of the Estimation Specification Card, each key beginning a new card and containing as many elements as the rank of the model for significance testing, indicating a new order. Elements separated by commas, ended with a period. Comments following period. Free format. Any number of cards.

PHASE III - ANALYSIS

The following set (A-D) may be repeated any number of times.

A. Analysis Selection Card*

Cols. 1- 4* Number of dependent variables. (NDEP) (p. 61)

Cols. 5- 8 Number of covariates. (NCØV) Optional. (p. 61)

Col. 12 1 if variables are to be deleted or rearranged to obtain the desired sets. Covariates must be ordered last.

Blank otherwise. Optional. (p. 61)

Cols. 13-16		Number of alternative basis orders to be run with this set of variables - other than the first. Optional. (p. 61)
Col.	20	1 for principal components of correlation matrix. Blank otherwise. Optional. (p. 62)
Col.	24	1 to perform discriminant analysis. Blank otherwise. Optional. (p. 62)
Col.	28	1 to print hypothesis mean products. Blank otherwise. Optional. (p. 62)
Col.	32	1 to perform canonical correlation analysis, if there are covariates. Blank otherwise. Optional. (p. 62)
Col.	36	1 if covariates are to be entered into regression by user's key. Blank to enter one-at-a-time. Ignore if no covariates. (p. 36)

B. Variable Select Key. Optional. (p. 63)

If column 12 on the Analysis Selection Card is 1, this key is entered with (NDEP + NCØV) elements, indicating the variable order. Elements separated by commas, ended with a period. Free format. Any number of cards.

C. Covariate Grouping Key. Optional. (p. 64)

If column 36 on the Analysis Selection Card is 1, this key is entered, each element indicating the number of covariates to be added to the regression equations. Covariates taken successively in the order in which they have been selected by the Variable Select Key or by their order upon input. Elements separated by commas, ended in a period. Comments following period. Free format. Any number of cards.

D. Hypothesis Test Card(s)* (p. 65)

One or more cards for the original basis order plus one or more for each alternative order indicated in columns 13-16 on the Analysis Selection Card. Indicates grouping of between-cell degrees of freedom for tests of hypotheses. Degree of freedom numbers separated by commas, ended with a period. Comments following period. Free format.

Last Card of a Job.* (p. 67)

Cols. 60-67 CØNTINUE if data for another run follows immediately.
Cols. 60-63 STØP if this is the end of the last run.

In case of a job error, cards will be read until one of these codes is encountered.