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VROOM-YETTON MODEL OF LEADERSHIP
DECISION-MAKING**
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A TEST OF THE VALIDITY OF THE VROOM-YETTON MODEL
OF LEADERSHIP DECISION-MAKING

By

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The results indicated that there was a significant amount of variance in the selection of decision styles attributable to both individual subject differences and situational differences. These individual differences were further explored by the examination of the subjects' personality characteristics and by a Q-type principal components analysis of the subjects' responses. No significant relationships were found between the personality dimensions (achievement, autonomy, cognitive structure, dominance, and order) and leader decision style or leader effectiveness. The principal components analysis did identify groups of decision strategies that were then examined by analysis of variance of subjects' responses. From these analyses, three different leader strategies were identified and labeled human relations oriented, leader influence oriented and Vroom-Yetton model oriented. Results also indicated that a majority of the subjects were utilizing the problem attributes interactively. It was concluded from these analyses that the contingency assumptions of the model were supported.

Several different analyses were employed to examine the descriptive assumptions of the model. It was found that the correlations between subjects' responses to both the Cases and the Sets and the responses prescribed by the model's Least Manhour Criterion (LMC) were generally high, and the subjects agreed with the LMC and the feasible set at considerably more than chance levels. The Vroom-Yetton

model is defined by a series of ten rules that dictate the prescribed relationship between the presence or absence of the problem attributes and the selection of the decision styles. It was found that the subjects violated all of the rules, except one, at less than chance levels when responding to both the Cases and the Sets. Since the goal congruence rule was violated at chance levels, it was concluded that the subjects did not use this rule as a component in their criteria to select decision styles. It was speculated that, although these leaders perceived a need to process this type of an issue in a group forum, they may have been overestimating the influence afforded to the group. The results indicated that 45 percent of the variance in the selection of decision styles was accounted for by the presence or absence of the eight problem attributes. Furthermore, it was discovered that not all problem attributes were of equal importance in the selection of decision styles with the attribute goal congruence independently accounting for 15 percent of the variance and problem structure independently accounting for almost no variance. It was also found that leaders do not make the distinction between group and individual problems completely consistent with the model. In most respects, the basic descriptive properties of the model were supported, but in some cases the model calls for finer discriminations than were made by leaders in the present study.

The normative aspects of the model were inspected by relating four Vroom-Yetton similarity indices to performance and satisfaction measures by means of canonical correlation analysis. A marginally significant relation was found between the Vroom-Yetton indices and satisfaction, for the Cases, and performance for the Sets. Examination of the canonical variates revealed that superior performance in the human relation aspects of the job are related to the Vroom-Yetton LMC, however, superior performance in the technical skills aspects are related to similarity to the model's feasible set. It was concluded that the relationships were not strong support for the normative aspects of the model.

In the second study, the generalizability of the Vroom-Yetton model was examined by determining its appropriateness in the resource allocator and disturbance handler roles defined by Mintzberg (1976). New case studies were written for this study that described leaders in these two roles. It was found that the Vroom-Yetton model was generally more applicable to leaders in the resource allocator role rather than the disturbance handler role. It appears that when leaders are in the disturbance handler role they are less likely to use the autocratic and delegative decision styles than when in resource allocator roles.

Finally, it was suggested that additional research is necessary to clarify the relationship between similarity to the model and leader effectiveness. Within this general

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area the development of better similarity indices and the examination of the appropriateness of the LMC are important issues.

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Although my name is conspicuously transcribed on the cover of this document, the research within is actually the combined effort of many people. I would like to thank the members of my committee, Bob Davis, Carl Frost, Mike Moore, and Neal Schmitt for their significant contributions. I would particularly like to thank good old Neal, my chairperson, for both his unsurpassed professional advice and personal friendship. In addition, a large proportion of gratitude is extended to my learned colleague and friend, Carol Bylenga, for her assistance in all aspects of the research. I am also grateful to Kathy Kohl and Elaine Bishop for their help in dealing with the voluminous paper work.

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INTRODUCTION

Throughout the last several decades an abundance of research has been undertaken in order to augment the understanding of leadership within industrial organizations. In an idyllic manner the study of leadership can be viewed as the inspection of interpersonal behavior between the one who leads and the one who is led. Katz and Kahn (1966, p. 301) assert that, "Leadership is a relational concept implying two terms: the influencing agent and the person influenced. Without followers there can be no leader." However, a third term is also implicit within this statement, that is the environment. Without a situational context there can be no leaders nor followers. Hence the parameters of the study of leadership encompass the leader, the follower and the situation.

In order to integrate these three concepts various theories of leadership have been proposed. The purpose of these theories has been to explain what leadership is and how it effects both individuals and groups (Stogdill, 1974). The orientation of the theories has changed in response to empirical research demonstrating the limitations of the theories. As a whole, leadership theory can be viewed as

an evolutionary process. When a particular theory fails to explain satisfactorily the nature of leadership or its impact on the followers, a new theory emerges that is altered in a manner that avoids the inadequacies of its predecessor. Hence, the critical focus of leadership research has been, and continues to be, on obtaining evidence that supports or refutes the validity of the theory. Validity, as used here, means the ability of a theory to classify leadership components and make predictions between these classifications and a wide variety of common leadership outcome variables.

In the next section of this paper a brief review of the evolution of leadership theory will be presented. The review will commence with early attempts to understand leader behavior and will terminate with the Vroom-Yetton normative model of leadership which is the primary subject of this investigation.

THE EVOLUTION OF LEADERSHIP THEORY

Trait Theories

Initial efforts in leadership theorizing concentrated on determining general traits or constellation of traits that were associated with successful leaders. One such conception characterizes leadership as an unidimensional personality trait. This theory assumes that individuals have varying amounts of the trait which determine the effectiveness of their leadership. In order for this theory to be valid, Gibb (1968) suggests that it is necessary for all types of environments and cultures to exhibit this trait. He concludes that no such trait has yet been found and much evidence has been accumulated to dispute the unitary trait theory (Stogdill, 1948; Mann, 1959; and Bass, 1960).

A modification of the unitary-trait theory labeled the constellation of traits theory states that each person's leadership capacity is determined by a pattern of traits. The pattern may shift from one situation to another but this theory stipulates that the determinants of leadership effectiveness are found in the personality of leaders (Gibb, 1969). Stogdill (1948) conducted a thorough review of the literature on the relationship between

personality and leadership and concluded that factors which are associated with leadership could be classified as capacity, achievement, responsibility, and participation. He concluded,

The findings suggest that leadership is not a matter of passive status or of the mere possession of some combination of traits. It appears rather to be a working relationship among members of a group, in which the leader acquires status through active participation and demonstration of his capacity for carrying cooperative tasks through to completion (Stogdill, 1948, p. 15).

The conception of leadership as a personality characteristic proved to be an oversimplification of the process. Significant correlations have not consistently been found for many traits, and when they were found the traits were too general (self-confidence or empathy) to be of use in theory building or prediction of leader success (Mintzberg, 1973).

The Behavioral Dimensional Theories

Following the decline in popularity of the trait approach, theorists began to concentrate on the actual behavioral dimensions and quantitative instruments to measure them.

In the mid 1940s the Bureau of Business Research at Ohio State University instituted extensive research to construct an instrument for describing leadership. From a large pool of items, the 150 that best represented ten a priori dimensions were administered to a large summer school sample. The subjects were asked to describe the

leader of a group in which they were a member. Hemphill and Coons (1957) intercorrelated and factor analyzed mean scores of the ten dimensions and obtained three orthogonal factors. They may be described as (1) behaviors that are socially agreeable to group members; (2) behaviors that result in the output of the group; and (3) behaviors that structure communication among group members. Halpin and Winer (1957) revised the above questionnaire and administered it to a larger number of bomber crews who described their crew commanders. A factor analysis was performed on this data in order to reorganize the items into fewer and more independent categories of behavior. This was accomplished by correlating eight a priori dimensions with 130 items (mostly from the original Hemphill and Coons questionnaire). The above procedure yielded four orthogonal factors. (1) Consideration. Behaviors demonstrating friendship, trust and respect; (2) Initiating structure. Behaviors that organize patterns of organization; (3) Production emphasis. Behaviors which stress the job to be completed; and (4) Sensitivity. Awareness of social interrelationships.

Halpin and Winer dropped the third and fourth dimensions because they accounted for too little common variance. These results and this scale (The Leader Behavior Description Questionnaire) have come to be well known and consideration and initiating structure are now identified as the Ohio State dimensions of leadership.

Concurrent with the Ohio State studies the University of Michigan Survey Research Center also developed behavioral dimensions of leadership. Katz, Maccoby, and Morse (1950) located clusters of characteristics which correlated positively with themselves and effectiveness of the leader. They found two dimensions of leadership.

(1) Employee orientation. Behaviors by the supervisor that denote his positive feelings toward his subordinates; and
(2) Production orientation. Behaviors by the supervisor that stress getting the work done and technical aspects of the job.

Likert (1961), working with data from the Life Insurance Agency Management Association, suggests five dimensions which he reports are necessary for effective supervisory behavior. (1) Principle of supportive relations --building subordinate sense of personal worth and importance; (2) Group methods of supervision--building a high degree of group loyalty and effective skills of interaction; (3) High performance goals--supervisors must be both employee-centered and at the same time have high performance goals; (4) Technical knowledge--supervisors must have adequate competence to handle technical problems; and (5) Coordinating, scheduling, planning. The supervisor brings to the group the views, goals, and decisions of other groups to provide communication and influence decisions. These behavioral dimensions have been

integrated by Likert (1967) into a theory of participative-group management which has been labeled System 4 management.

Bowers and Seashore (1966) reviewed a large number of leadership studies and concluded that a great deal of conceptual content was held in common. By integrating the studies on leadership they proposed four dimensions which they state ". . . seem to comprise the basic structure of what one may term leadership." They are: (1) Support. Behaviors that encourage a feeling of personal worth; (2) Interaction facilitation. Behaviors which encourage satisfying relationships; (3) Goal emphasis. Behaviors which encourage goal attainment; and (4) Work facilitation. Behaviors which help goal attainment by planning and providing resources.

Implicit in much of this research was the assumption that different styles of leadership or different leader characteristics would result in diverse levels of subordinate performance and satisfaction. Therefore, a great deal of effort was directed at attempting to determine the "best" or more productive types of leadership. Unfortunately much of this research had led to equivocal results. For example, field experiments by Coch and French (1948), Brarclas (1948), and Marrow, Bower, and Seashore (1967) have produced evidence that participative decision making does increase productivity. On the other hand, studies by French, Israel, and As (1960), Fleishman (1965), and Morse and Reimer (1956) found no significant differences in

productivity between participative and autocratic work groups. Among the several possible reasons for these outcomes one appears to be most important. An effective pattern of behavior in one situation may not be effective in other situations. Based on this assumption contingency models of leadership were developed and now appear to be the most promising framework for studying leadership.

Concomitant with this view of leadership is a new focus on the definition of leadership. No longer is it conceptualized as a general trait or a fixed behavior pattern, but rather as a role to be performed within certain established boundaries (Vroom, 1976). Although contingency models of leadership may appear on the surface to be a radical departure from previous research orientations, this is substantially a sophisticated outlook. In fact, contingency models are in response to the tremendous amount of research on behavioral dimensional theories and are modifications of these theories to handle inconsistent findings. For example, the five dimensions of Likert's System 4 are actually consequences of both leader behavior and organizational conditions. Therefore, this particular model of leadership can easily be transcribed into a contingency model. In a similar manner other dimensional theories have implicit contingency aspects within them.

In summary it may be stated that contingency models are a temperate revision of leadership theory that shifts a portion of the emphasis from static behavioral

characteristics of the leader to leader behaviors in a dynamic environment. They also have the effect of altering the focus of research from the leader as a person to one on the psychological process of leadership (Hammer & Dachler, 1975).

Contingency Theories of Leadership

Robert Tannenbaum and Warren Schmidt (1958) pioneered in formal contingency models of leadership when they presented an interactive model of leadership. They viewed leadership behavior in terms of the degree of authority used by a supervisor and the amount of freedom available to subordinates in making decisions. Inherent within this model is the assumption that the supervisor utilizes differing amounts of authority and differing levels of subordinate autonomy depending on the nature of the particular situation or problem. Antecedents that contribute to the chosen style of leadership are perceived as stemming from the supervisor, the subordinates, and the situation. Hence, these three "forces" interact to determine the leader behaviors that will be exhibited in each situation. The major limitation of this model is that it encompasses a prohibitively large number of variables and hence provides no prescriptions for appropriate leader behaviors for all situations. It does however, offer a theoretical orientation that allowed others to develop operationalized contingency models.

In 1964, Fred Fiedler proposed a theoretical explanation of much of the rather ambiguous results which had come to his attention in the previous decade of research on leadership. His theoretical approach has been labeled the contingency theory of leadership. What Fiedler essentially postulates is that the relationship between leadership style and group effectiveness is moderated by a situational favorability dimension. The emergence of the contingency theory was guided by the notion that the leader's style of interacting with his/her subordinates will be affected by the degree to which he/she can wield power and influence (Fiedler, 1967).

Fiedler classifies interacting groups along three dimensions of situational favorableness for the leader. They are (from Fiedler, 1967):

1. The leader's position power is defined as the degree to which the position itself enables the leader to get his/her group members to comply with and accept his/her direction and leadership.
2. The structure of the task is defined as the degree to which the activities of the group are programmed. For example, open hearth steel crews were classified as highly structured and ad hoc student groups were classified as unstructured.
3. Leader-member relations represent the leader's evaluation of the subordinates' reaction to him or her and the subordinates' reaction toward the leader.

The three dimensions are dichotomized into two levels and are represented by a cube with eight cells or octants. These cells range from Octant I (good leader-member relations, high task structure, and high position

power) to Octant VIII (poor leader-member relations, poor position power, and an ambiguous task). The theory specifies that a very favorable situation is one that would fall within Octant I, while a very unfavorable situation falls within Octant VIII. The contingency model then postulates that group performance is contingent upon matching a leadership style and the degree of favorableness of the situation, that is, the degree to which the situation provides the leader with influence over the subordinate. This model suggests that group performance can be improved either by modifying the leader's style or by modifying the group-task situation.

A major underlying assumption of this theory is that no one type of leadership will be effective in all situations. Fiedler views leadership in terms of motivational systems. He hypothesizes that "relationship-motivated" leaders seek primarily to maintain good interpersonal relationships with co-workers, while "task-motivated" leaders strive to accomplish some tangible goal (Fiedler, 1974). Fiedler assesses the motivational systems of leaders by use of the Least Preferred Co-Worker (LPC). This measurement is obtained by asking the subject to rate the person he or she least likes working with on a bi-polar, eight-point scale of the semantic differential format. High-LPC persons, i.e., individuals who describe their LPC in relatively positive terms are primarily relationship motivated. Low-LPC persons, those who describe their least preferred

co-worker in very unfavorable terms, are task-motivated. Fielder (1974) notes that the LPC is not a description of leader behavior, since high or low LPC leaders change with different situations, but is rather a general measure of their motivational system.

Based on a good deal of past research the contingency model predicts that task-motivated leaders (Low LPC) will perform best in very favorable conditions or in very unfavorable conditions, while relationship-motivated leaders (High LPC) will perform best in moderately favorable conditions.

This model of leadership has by far generated more research, both supportive and contradictory, than any other such model. Therefore, I will not attempt to cite all the relevant studies in this area, but will rather only summarize and list major findings and conclusions. The interested reader should consult Fiedler (1967, 1971) and Chemers and Rice (1974) for a comprehensive review of the empirical findings.

Fiedler (1974) has extrapolated data from 1963 to 1971 and presented the combined results in a figure (Fielder, 1961, p. 69). Fiedler states,

The solid curve connects the median correlation within each of the octants obtained in the original studies (before 1963) on which the model was based. The broken line connects the median correlations obtained in various validation studies from 1964-1971. As can be seen, the two curves are very similar, and the points on the curves correlate .76 ($p < .01$) (Fiedler, 1974, p. 70).

This summary seems to indicate that this model has generally been supported by the latest research and is, therefore, valid. Other writers do not share this opinion and continually attack Fiedler's findings.

Most of the criticism concerning this model questions the empirical validity of the theory, the methodological rigor in the experimentation, and the adequacy of this theory as a theory. The major criticisms will be listed in summary form below.

1. In a review of the theory in question Graen et al. (1970) compared mean correlations for the octants and found that the systematic relationship could not be accounted for by Fiedler's favorability dimensions. Furthermore, out of 51 correlations used to test the model only two reached significance. Thus, the conclusion was reached that the findings which support the contingency model are trivial.
2. The instruments used to measure the situational dimensions are "weak" and subject to contamination (Ashour, 1973).
3. Fiedler has offered no evidence to support the contention that some situations are favorable to the leader while others are not (Mitchell, et al., 1970).

4. Because of the broad sampling of setting and populations the data could be simply a function of sampling error rather than true differences between conditions (Korman, 1971).
5. The LPC lacks acceptable test-retest reliability and construct validity (Fiedler himself offers four explanations of this measure) (Ashour, 1973).
6. Marx (1963) criticizes this theory because it fails to meet the properties of a theory in that because of methodological deficiencies it has a limited capacity to guide meaningful research.
7. Ashour (1973) states Fiedler's approach lacks explanatory power.
8. A lab study designed to test Fiedler's model failed to find any support for the predictions (Grach, Orris, & Alvares, 1971).

Fiedler's contingency model was an attempt to explain the relationship between supervisory behavior and effectiveness. The limited success may be attributed to the fundamental orientation of the model. Vroom (Vroom & Yetton, 1973) points out that Fiedler's model is a situational adaptation of the personality trait conception of leadership. He uses a static individual difference measure as an independent variable and includes situational measures as moderator variables. Most reviewers note that its major failing appears to be in the individual difference measures (Hunt, 1967; Hill, 1969; Mitchell, 1969).

This model does not allow for the possibility that the leader's behavior may be influenced by the situation or that leaders develop varying sets of decision rules depending on the particular situation. Fiedler offers no evidence that leadership is as rigid as the model demands. If leadership is a learned set of behaviors then these behaviors can be modified through new learning (Vroom, 1976).

Fiedler's contingency model was a major step forward for leadership theory. It focused the attention of researchers on the importance of the interaction between the situation and leader behavior. While it is an important link in the evolutionary chain of leadership theory, its practical implications are uncertain at this time. The overwhelming evidence from validation studies fails to support the theory's predictions and the rationale behind the classification system. Its major value rests in that it prompted others to propose contingency models that circumvent the inaccuracies of this model.

In contrast to Fiedler's approach, Vroom and Yetton (1973) have proposed a normative model of leadership based on the decision making process at the individual level. They view the leadership role as controlling the process by which decisions are made. The major focus of this approach is to monitor the decision making strategy of the person in a leadership role and to develop a systematic set

of criteria for selecting the optimal alternative from a well defined set.

This conceptualization is consistent with the work of March and Simon (1958) and Cyert and March (1963) which contends that understanding the decision making process is critical for the explanation of both individual behavior and organizational behavior. In addition, studies utilizing factor analysis have also indicated the importance of decision making for effective leadership (Bray, Campbell, & Grant, 1975; Hinrichs, 1969; Schmitt, 1977).

Vroom and Jago (1975) have noted that there are both normative and descriptive questions concerning leadership that are relevant to this model, which is typical of leadership models that have been proposed recently (i.e., Blake & Mouton, 1964; Maier, 1974). The descriptive questions center on understanding what and how components of a situation have impact on a leader's decisions. Normative questions seek knowledge concerning the desirability of choosing among the various alternatives available to a leader. The latter questions are most important when one is interested in applying models to obtain optimal solutions to organizational problems (Vroom, 1976).

In 1968, Dr. Vroom had just completed a comprehensive review of the literature on participative decision-making and was somewhat disturbed by the conflicting findings that research had yielded. To resolve this situation Vroom along with Yetton, then a graduate student at

Carnegie-Mellon, committed themselves to the construction of a normative model of leadership behavior which would systematize the multiple outcomes of participative decision-making in a framework which could be utilized to describe and predict the policies used by leaders. To accomplish this goal they chose a multiple-path decision process. The rationale behind this method was that the leadership role can be conceptualized as controlling the process by which decisions are made.

In any situation where a decision must be made that will effect his/her subordinates and organizational effectiveness the leader can make the decision in a number of ways. He/she can, for example, make the decision himself/herself with no inputs from others, or he/she can involve the subordinates in the decision to varying degrees. The method which is chosen will depend on the situation as defined by the specific attributes of the problem being solved. Vroom and Yetton undertook the explanation of which type of decision strategy would be implemented by the constructing of decision trees that reflected the principle implication of research (Vroom & Yetton, 1973). Their method was one of trial and error which demanded that the model be re-evaluated and revised periodically. Following their early speculations they began empirical research on situational factors which influence leadership decisions. This led to a formal defining of problem attributes and decision-making rules to define effective leadership in

the model. Vroom and Yetton continued to collect more data and revise the model, and in 1973 they published a book explaining the model and describing the extensive research which they had completed on it. Although this model has been in print for a few years now, the reader should be cautioned that the authors are still revising it and many of the earlier models have been replaced by more complicated ones that fit the data more closely.

Vroom and Yetton commenced with the assumption that influence afforded subordinates in a decision-making process has profound consequences on the nature of that decision. A supervisor who autocratically makes a decision may need to implement that decision in a different manner than if his/her work group had been consulted in the decision making process or were given the opportunity to make the decision themselves. Since there is substantial agreement that these decision making processes are distinguishable and are commonly used in organizations, attention was turned to identifying the differences in process of each style of leadership. From this analysis, Vroom and Yetton (1973) defined a taxonomy of decision processes that were likely to have different consequences on solutions and were descriptive of the usual methods of leadership employed by managers in their normal routine dealing with both individuals and groups. This taxonomy is exhibited in Table 1. Each process is labeled by a symbol, e.g., AI, CII, GI, DI; the letter symbolized the nomenclature which

Table 1.--Types of Management Decision Styles.

For Individual Problems	For Group Problems
AI You solve problem or make decision yourself using information available to you at that time.	AI You solve problem or make the decision yourself using information available to you at that time.
AII You obtain any necessary information from the subordinate, then decide on solution to problem yourself. You may or may not tell the subordinate what the problem is in getting the information from him. The role played by your subordinate in making the decision is clearly one of providing specific information which you request, rather than generating or evaluating alternative solutions.	AII You obtain any necessary information from subordinates, then decide on solution to problem yourself. You may or may not tell subordinates what the problem is in getting the information from them. The role played by your subordinates in making the decision is clearly one of providing specific information which you request, rather than generating or evaluating alternative solutions.
CI You share the problem with the relevant subordinate, getting his ideas and suggestions. Then <u>you</u> make the decision. This decision may or may not reflect your subordinate's influence.	CI You share the problem with the relevant subordinates individually; getting their ideas and suggestions without bringing them together as a group. Then <u>you</u> make the decision. This decision may or may not reflect your subordinates' influence.
GI You share the problem with one of your subordinates and together you analyze the problem and arrive at a mutually satisfactory solution in an atmosphere of free and open exchange of information and ideas. You both contribute to the resolution of the problem with the relative contribution of each being dependent on knowledge rather than formal authority.	CII You share the problem with your subordinates in a group meeting. In this meeting you obtain their ideas and suggestions. Then, <u>you</u> make the decision which may or may not reflect your subordinates' influence.

Table 1.--Continued.

For Individual Problems	For Group Problems
DI You delegate the problem to one of your subordinates providing him with any relevant information that you possess, but giving him responsibility for solving the problem by himself. Any solution which the person reaches will receive your support.	GII You share problem with your subordinates as a group. Together you generate and evaluate alternatives and attempt to reach agreement (consensus) on a solution. Your role is much like that of chairman, coordinating the discussion, keeping it focused on the problem and making sure that the critical issues are discussed. You do not try and adopt "your" solution and are willing to accept and implement any solution which has the support of the entire group.

commonly associated with that style of leadership, (A = autocratic, C = consultative, G = group and D = delegative) and the numeral constitutes variation on that process.

Once criterion sets of leader behaviors had been established, Vroom and Yetton turned their attention toward describing situational attributes which are characteristic of the problem to be solved or decisions to be made. From previous research on the consequences of participative decision-making they isolated the following problem attributes (Vroom & Yetton's problem attributes have been revised since the first publication and to avoid confusion only their most recent one (Vroom & Jago, 1974) will be exhibited here):

Problem Attributes

- A. The importance of quality of the decision.
- B. The extent to which the leader possesses sufficient information/expertise to make a high-quality decision by himself or herself.
- C. The extent to which the problem is structured.
- D. The extent to which acceptance or commitment on the part of subordinates is critical to the effective implementation of the decision.
- E. The prior probability that the leader's autocratic decision will receive acceptance by subordinates.
- F. The extent to which subordinates are motivated to attain the organizational goals as represented in the objectives explicit in the statement of the problem.
- G. The extent to which subordinates are likely to be in conflict over preferred solutions.

- H. The extent to which subordinates have sufficient information to make high quality decisions.

These problem attributes are intended to represent the essential properties of the situation or problem and are the basic elements of the Vroom-Yetton model. The objective of this model of leadership is to provide a tool for supervisors to rationally regulate choices among leadership styles in order to maximize the supervisor's effectiveness. The effectiveness of a decision is thought to be a function of (1) the quality of the decision; (2) the acceptance or commitment on the part of subordinates to execute the decision effectively; and (3) the time required to make the decision (Maier, 1974).

Based on a large amount of past research that is summarized in Vroom (1970) and Vroom and Yetton (1973), Vroom established three sets of rules. The first set contains seven rules which were adopted to protect the quality of the leader's decision by eliminating alternatives within prescribed circumstances where there was substantial risk that the mandatory controls needed to ensure a high quality decision were absent. A second set of six rules serve to protect the acceptance of the decision by eliminating alternatives that would impose a leadership decision style that is likely to be unacceptable to subordinates. The third set incorporated a single rule for selecting alternatives when more than one decision process violates none of the

rules in the first two sets. These rules may be summarized as follows (from Vroom & Jago, 1974):

Rules Protecting Decision Quality

1. The Leader Information Rule: If the quality of the decision is important and the leader does not possess enough information or expertise to solve the problem by himself, then AI is eliminated from the feasible set.
2. The Subordinate Information Rule: (Applicable to individual problems only.) If the quality of the decision is important and the subordinate does not possess enough information or expertise to solve the problem himself, then DI is eliminated from the feasible set.
- 3a. The Goal Congruence Rule: If the quality of the decision is important and the subordinates are not likely to pursue organization goals in their efforts to solve this problem, then GII and DI are eliminated from the feasible set.
- 3b. The Augmented Goal Congruence Rule: (Applicable to individual problems only.) Under the conditions specified in the previous rule (i.e., quality of decision is important, and the subordinate does not share the organizational goals to be attained in solving the problem) GI may also constitute a risk to the quality of the decision taken in response to an individual problem. Such a risk is a reasonable one to take only if the nature of the problem is such that the acceptance of the subordinate is critical to the effective implementation and prior probability of an autocratic solution is low.
- 4a. The Unstructured Problem Rule (Group): In decisions in which the quality of the decision is important, if the leader lacks the necessary information or expertise to solve the problem by himself and if the problem is unstructured, the method of solving the problem should provide for interaction among subordinates. Accordingly, AI, AII, and CI are eliminated from the feasible set.
- 4b. The Unstructured Problem Rule (Individual): In decisions in which the quality of the decision is important, if the leader lacks the necessary information to solve the problem by himself and if the problem is unstructured, the method of solving the

problem should permit the subordinate to generate solutions to the problem. Accordingly, AI and AII are eliminated from the feasible set.

Rules Protecting Acceptance

5. The Acceptance Rule: If the acceptance of the decision by subordinates is critical to effective implementation and if it is not certain that an autocratic decision will be accepted, AI and AII are eliminated from the feasible set.
6. The Conflict Rule: If the acceptance of the decision is critical, an autocratic decision is not certain to be accepted and disagreement among subordinates in methods of attaining the organizational goal is likely, the methods used in solving the problem should enable those in disagreement to resolve their differences with full knowledge of the problem. Accordingly, AI, AII and CI, which permit no interaction among subordinates, are eliminated from the feasible set.
7. The Fairness Rule: If the quality of the decision is unimportant, but acceptance of the decision is critical and not certain to result from an autocratic decision, the decision process used should permit the subordinates to interact with one another and negotiate over the fair method of resolving any differences with full responsibility on them for determining what is equitable. Accordingly, AI, AII, CI, and CII are eliminated from the feasible set.
8. The Acceptance Priority Rule: If acceptance is critical, not certain to result from an autocratic decision and if (the) subordinate(s) is (are) motivated to pursue the organizational goals represented in the problem, then methods which provide equal partnership in the decision-making process can provide greater acceptance without risking decision quality. Accordingly, AI, AII, CI, and CII are eliminated from the feasible set.
9. The Group Problem Rule: Group If a problem has approximately equal effects on each of a number of subordinates (i.e., is a group problem) the decision process used should provide them with equal opportunities to influence that decision. Use of a decision process such as GI or DI which provides opportunities for only one of the affected subordinates to influence that decision may in the short run produce feelings of inequity reflected in

lessened commitment to the decision on the part of those "left out" of the decision process and, in the long run, be a source of conflict and divisiveness.

10. The Individual Problem Rule: Individual If a problem affects only one subordinate, decision processes which unilaterally introduce other (unaffected) subordinates as equal partners constitute an unnecessary use of time of the unaffected subordinates and can reduce the amount of commitment of the affected subordinate to the decision by reducing the amount of his opportunity to influence the decision. Thus, CII and GII are eliminated from the feasible set.

Rule for Selecting Among Alternatives
in the Feasible Set

11. Given a set of methods with equal likelihood of meeting both quality and acceptance requirements for the decision, select the method that requires the least investment in manhours (this has been labeled the least manhours criterion (LMC)).

From the above principles and within the boundaries established by the problem attributes and decision-making taxonomy sets, Vroom and Yetton conceptualized a normative model of leadership which is shown in Figure 1. Expressed in the form of a decision tree, the model implies that the decision maker asks himself/herself a series of Yes-No questions. To use the model one starts at the left-hand side of the tree and proceeds to the right answering the questions indicated at each point. When a terminal node is reached at the end of a particular branch, a leader decides among the set of feasible alternatives presented at the bottom of Figure 1. The feasible sets are comprised of the management decision styles presented in Table 1 and are determined by reference to the sets of rules. The feasible

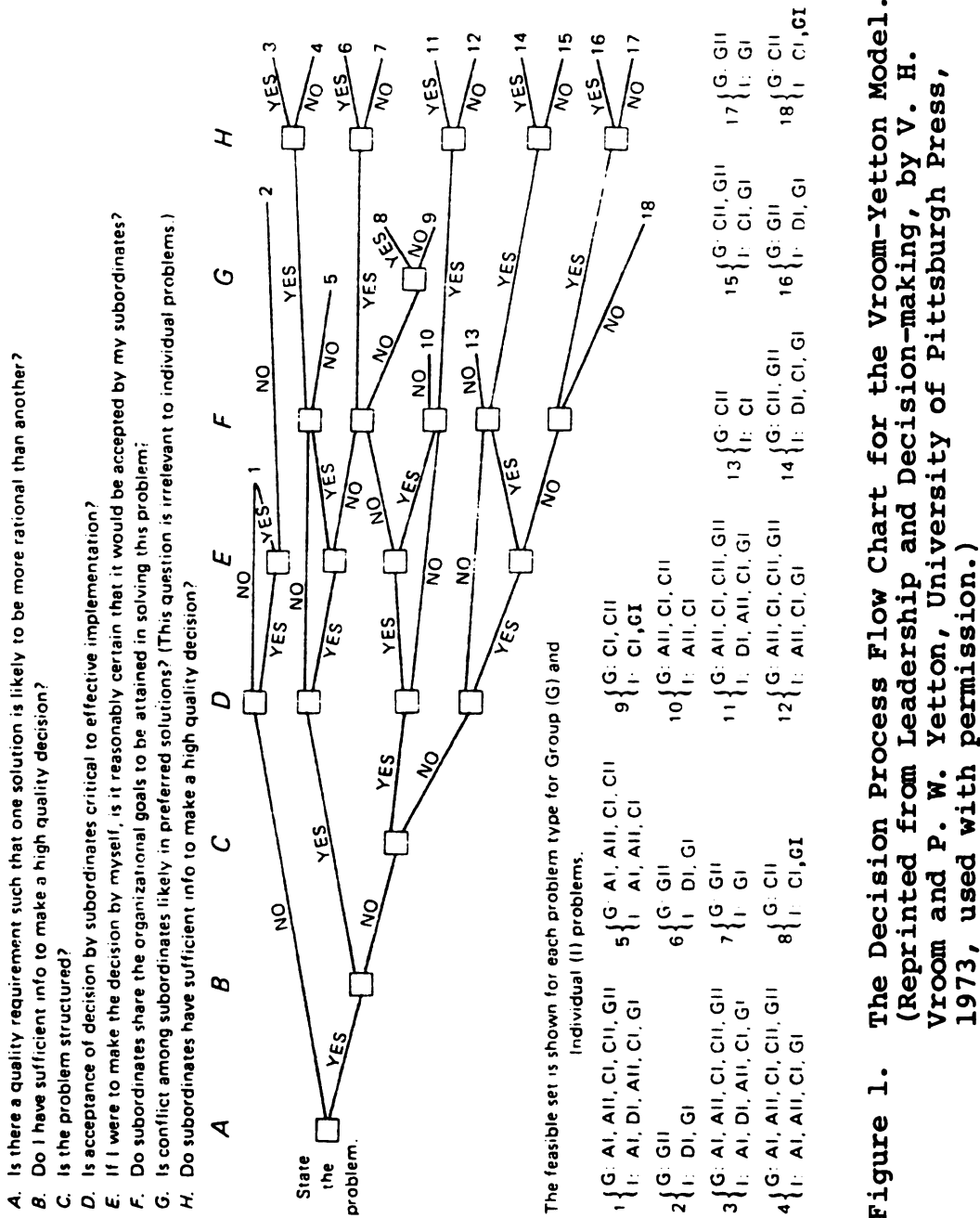


Figure 1. The Decision Process Flow Chart for the Vroom-Yetton Model.
 (Reprinted from Leadership and Decision-making, by V. H. Vroom and P. W. Yetton, University of Pittsburgh Press, 1973, used with permission.)

sets for each terminal node are written below Figure 1 and range from the most autocratic to the most participative alternative available to a decision maker in that situation. The first decision style is the one that conforms to the LMC.

The model outlined above is intended to protect the quality and acceptance of decisions and expend a minimum of manhours. Since this model concentrates on making and implementing a particular decision it is a short-term model. Vroom (1974) suggests that the model can be adapted to a long-term orientation by de-emphasizing the manhour rule. A replacement rule would involve a trade-off between man-hours and team development. The leader could select from the feasible set the management decision style that would suit both these needs over a long period of time.

The following section of this paper summarizes the research that has been completed by Vroom and his associates. There are two important validity issues to which most research has been directed. First does the Vroom-Yetton model of leadership actually represent the decision process of a leader; and do the rules which govern the model actually define an effective leader?

Two different research methods (both described in detail in Vroom and Yetton, 1973) have been employed to study this model. In one method called "recalled problems" leaders (which include managers, executives, graduate students and college faculty) are asked to recall and write

about a problem that they have recently solved. They are also asked to indicate which decision processes they used and are then asked to answer questions about the problem attributes. From this method a more sophisticated technique of study was derived. "Standardized Cases" were systematically developed from earlier manager reports. The situational attributes within the cases are systematically varied allowing the testing of hypotheses concerning a particular attribute, leader, or decision rule.

Vroom and Yetton (1973) have reported five studies that they conducted in both the development and the early validation stages of their normative model. It is not possible to describe the wealth of information discovered by this research in this paper, but I will summarize the most important findings.

Perhaps the most significant conclusion from this research is that leaders do employ more than one general leadership style. These results are consistent with the bulk of leadership literature. In fact, in studies using the standardized cases no manager indicated that he or she would use the same leadership process on all problems. Although individual leaders tend to use one process more than others, the data clearly indicates that participativeness or autocrateness is not a general trait that leaders exhibit in differing amounts. Vroom (1974, p. 59) concludes that, "(i)t makes more sense to talk about participative and autocratic situations than to talk about

participative and autocratic managers." These studies have shown that a large number of factors influence the leader's choice of leadership process, many of which are congruent with those proposed by the normative model. Multiple regression analysis demonstrated that the problem attributes such as structure, trust, importance of acceptance of the decision, and prior probability of decision acceptance are all significantly related to the chosen leadership process in accordance with the model. However, the interaction among problem attributes, as predicted by the model were not found to be significant.

In terms of the validity of the model, Vroom reports that the subjects in the studies use the same leadership process as predicted by the model 40 percent of the time. He further states that the four rules designed to protect the acceptance of the decision have significantly higher probabilities of being violated than the quality rules. One last conclusion that can be drawn from these studies is that the normative model predicts greater variance in selection of leadership process than is actually exhibited by the "typical manager."

In a study designed to test differences between group and individual problems Vroom and Jago (1974) administered a new 48 problem set to three manager populations. They found that managers do discriminate between group and individual problems. Managers chose for group problems processes that were designed for individual

problems in about only one-tenth of one percent of the time. It was found that the managers were more autocratic in individual problems than group problems. They also found a higher level of agreement between the subject's responses and the Vroom-Yetton model on individual problems than group problems.

This study also replicated Vroom and Yetton's (1973) earlier findings that the situation accounts for about three times as much variance as individual behavior. On group problems situational differences account for 34.7 percent of the variance in manager's behavior, while individual differences accounted for only 11.7 percent. This difference was even greater for individual problems where a 44 to 8.7 percent split in the variance was found.

Results of the study were supportive of two major assumptions of the Vroom-Yetton model. The finding that the situation accounts for more variance in the leader's style than individual differences indicates that subjects' behaviors are being moderated by situational effects thereby supporting a general contingency model of leadership to explain leader behavior. The conclusion that managers do in fact alter their decision style depending on whether they are dealing with groups or individuals supported Vroom's contention that leadership models must contain components that deal with the two situations in a differential manner.

In a recent study Hill and Schmitt (1977) originated an abbreviated methodology for assessing leader decision making in terms of the Vroom-Yetton model. In place of the cases they used 64 hypothetical problems consisting of all possible combinations of the presence and absence of each of six problem attributes. In order to use this new instrument they were forced to shorten the model so that it contained only six problem attributes. Hill Schmitt's adaptation of the model is presented in Figure 2. The results of the study were generally supportive of the Vroom-Yetton model. They found that the subject's response to the problem sets agreed with the model more than would be expected by chance. It was also found that there were individual differences in the utilization of the problem attributes that conformed loosely to the quality and acceptance dimension proposed by Vroom. Along these lines, it was discovered that most of the leaders based their decision on only two or three of the problem attributes while ignoring the rest. It was also discovered that these two or three problem attributes were usually utilized interactively. Vroom's conclusion that the properties of the situation are most important in the leadership decision process than individual leader characteristics was supported in this study.

When Vroom and Yetton developed their leadership model, they obtained data from around 500 managers who worked in a large variety of business concerns. This data

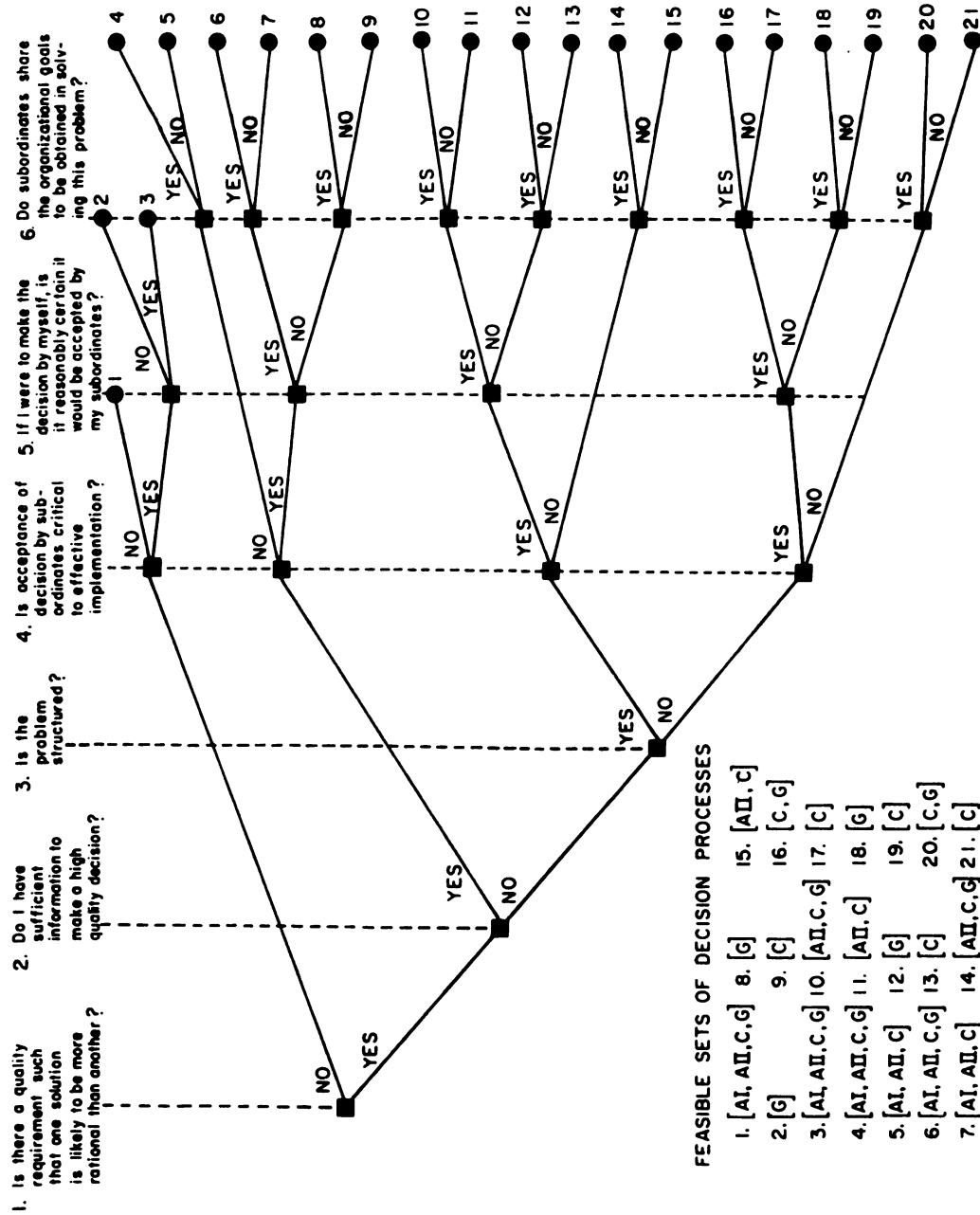


Figure 2. Abridged Vroom-Yetton model. (Reprinted from Individual differences in leader decisions, by T. E. Hill and N. Schmitt, 1977.)

was used to define the problem attribute structure of the situations as well as the cases used to assess leadership style. Since its conception there has been an implicit assumption that the model is valid regardless of the circumstances under which the leader must perform. On the surface this seems to be a reasonable assumption since the model was founded on a far-ranging data set and the model's reliance on the situation to determine the correct management decision style. However Vroom and his colleagues have not given any consideration to the role of the manager in decision-making.

Mintzberg (1973) conducted an extensive study on the nature of managerial work. Employing the structured observation technique he studied five experienced chief executives over a period of a week. Following the classification and analysis of an extensive amount of data he concluded that the most crucial component of the managerial position is the decision roles that he/she plays. In a manner similar to Simon (1965) he classified the decision roles into four categories of entrepreneur, disturbance handler, resource allocator and negotiator. Mintzberg views decision roles as points on a continuum ranging from purely voluntary innovative ones, to involuntary reactive ones. The voluntary end of the continuum is anchored by entrepreneurial decisions and at the other extreme are disturbance handling decisions. Resource allocator and negotiator decisions fall somewhere in the middle.

There has been no research on the relationship between decision role and participative decision making. However, some tangential data and speculation may be utilized to form hypotheses concerning this relation. Mintzberg points out that the decisions on the involuntary or disturbance handling end of the continuum have two properties that distinguish them from other roles. These are that the decision must be made during a crisis period and there are important time restrictions. Hamblin (1958) states that leaders have greater influence in decision making during periods of crisis than normally. Mulder and Wilke (1970) have found that leaders become less participative as they increase their expert power. Lowin (1968) has noted that group decision-making is limited when time pressures on decision-making are severe. Therefore, it seems reasonable to conclude that in the disturbance handling role leaders will be less willing to allow subordinates the opportunities to participate than in other decision roles. If this hypothesis is correct then a new problem attribute would have to be added to the Vroom-Yetton model or the model would have to be limited to the appropriate decision roles.

The studies described thus far have been solely concerned with descriptive properties of the Vroom-Yetton model. They have demonstrated that the model, in general, does describe the way managers actually behave in leadership situations. However, these studies have shown no

evidence that effective leaders more closely resemble this model than less effective leaders. In an attempt to demonstrate the validity of the model, Vroom and Jago (1976) obtained narrative descriptions of a successful and unsuccessful decision from 96 managers. The managers were then trained in the Vroom-Yetton model and instructed to trace the path of their leadership decisions on the decision tree. Analysis of this data showed that if the manager's behavior was consistent with the feasible set, the probability of that decision being successful was 68 percent. On the other hand, if the manager's behavior was inconsistent with the feasible set, a success rate of 21 percent was found. Vroom and Jago also found the Vroom-Yetton model to be superior in terms of explanatory power than a simpler situation-independent model based solely on the assumption that more effective decisions are due to greater amounts of participative decision-making.

This study offers preliminary evidence that is supportive of the validity of the Vroom-Yetton model. However, since the usual leadership instrument (case studies) was not used, the positive statements about validity apply only to the conceptual model and not to the operationalization of the model. In other words, although there is now some data to support this model on a theoretical level, no studies have been attempted to validate the problem sets.

Thus far, an attempt has been made to present a brief description of the evolution of leadership research. Some aspects of this progression are worthy of distinction. Leadership theory has proceeded from relatively simple trait models to prohibitively complex contingency models. This maturation of leadership theory has been precipitated by the inability of pre-existent theories to explicate the multiple causal relations among the leader's behaviors and work group or organization outcomes. When identifying leader personality or behaviors failed to explain the relationship between subordinate satisfaction or productivity and style of leadership, another factor, the environment, was appended and a new theory formulated. Thus in contrast to some popular notions that contingency models are a major departure from previous leadership models, it can be seen here that they are one step in the process of leadership theory development.

The latest extension of the theoretical chain is the Vroom-Yetton normative model of leadership. This model was founded on an extensive aggregate of leadership research and theorizing, and is an adaptation of several theories.

Whenever a theory is formulated by an inductive process it is critical that it be validated. While validation usually concerns the confirmation of the theory's predictions by results other than those which were used in its formulation, it may also encompass the affirmation of assumptions, classification systems, and relations among

the theory's components. Marx (1963, p. 39) states that one of the functions of theory is, ". . . to organize and order empirical knowledge so as to facilitate not only empirical predictions but also understanding of natural phenomena (by means of integrating conceptualization)." Therefore, a valid theory not only correctly makes predictions but also serves as a tool to enable us to understand why the components operate in the way they do.

In terms of the Vroom-Yetton theory of leadership there are several critical components that relate either to the validity of the theory by an external criteria or the validity of the theory by explaining the relationship between its concepts. These are:

1. No single leadership method is maximally effective in all situations.
2. The most appropriate unit for the analysis of leadership style is a person within a leadership role dealing with a specific situation. This implies that analyzing leadership in terms of traits or personality of the leader is not productive.
3. The most appropriate unit for the analysis of the situation is the particular problem to be solved which may be classified by the presence or absence of eight essential attributes.
4. In general, the rules governing the selection of a management decision style (represented in Figure 1) are descriptive of common methods used by leaders.
5. Leaders whose selection of management decision styles conform to those prescribed by the model are more effective leaders than those whose selection of leadership styles do not conform to the model.
6. The model is applicable to all leadership situations that are normally encountered in industrial organizations.

Although some of these issues have been already examined by Vroom and his associates none of these can be at the present time considered confirmed or disconfirmed. It is the purpose of this study to explore each of these issues and to examine the validity of the Vroom-Yetton theory of leadership.

STUDY 1--OBJECTIVES AND HYPOTHESES

The objective of the present study is to examine the validity of the Vroom-Yetton model of leader decision making by: (a) generating supportive evidence for a fundamental contingency theory of leadership; (b) confirming that that classification systems are internally consistent and descriptive of typical leadership behavior; (c) examining the relationship between the similarity of a leader's responses to those suggested by the model and an external criteria of performance and subordinate satisfaction; (d) examining the appropriateness of a noncompensatory model of decision-making in leadership situations.

The Vroom-Yetton model is founded on the assumption that leadership style is not a static trait or personality configuration, but rather is the result of the leader's ability to respond to a problem involving one or more identified subordinates in a particular situation. Hence, they claim that leadership must be studied on an individual level in a specific situation. This assertion has been somewhat supported by Vroom and Yetton's (1973) finding that the situation accounts for three times as much variance as that accounted for by individual leader differences.

This assumption precludes the use of personality variables in the identification of leadership styles. In fact, a systematic relationship among personality variables and the identification of leadership style or effectiveness would be evidence to refute a contingency model, hence, the Vroom-Yetton theory. Therefore, personality characteristics will be measured and related to leadership style and effectiveness to test this assumption. My hypotheses are as follows:

1. Both situational and individual differences will account for significant systematic variance in the selection of management decision styles.
2. The personality characteristics of the subjects will not significantly predict either the leadership classification variables nor effectiveness criterion variables.

The Vroom-Yetton model has several classification systems. It categorizes supervisors in terms of their conformity to the model, leadership styles by level of participation, situations by the problem attributes, and rules according to their intended purpose. In addition, measuring instruments and rules governing the systematic relationships among the systems have been formulated. Through a series of studies, Vroom and his associates have presented evidence that these systems do describe typical leadership behavior. A component of this study will be directed at confirming the descriptive properties of this model. The following are hypotheses that are concerned with these issues.

3. The subjects responding to the cases will agree with the least manhours criteria and will agree with the feasible set significantly more than chance level.
4. The variance in the selection of decision styles prescribed by the Vroom-Yetton model will fall within the 95 percent confidence interval computed from the subjects average variances in selection of decision style over the 48 Cases/128 Sets in this sample.
5. The subjects responding to the cases will violate the ten rules significantly less than what would be expected by a random process.
6. The subjects responding to the cases will use decision styles that are only applicable to group problems (CII and GII) significantly more on group problems than on individual problems.
7. The subjects responding to the cases will use decision styles that are only applicable to individual problems (GI and DI) significantly more on individual problems than on group problems.

An assumption of the normative model is that all problem attributes are of equal importance in selecting a management decision style. Past research has shown this may not be true. Vroom and Yetton (1973) have shown that problem attributes designed to protect quality are broken significantly less often than the problem attributes designed to protect acceptance of the decision. This implies that managers may perceive the quality problem attributes as being more important than the others. This study will attempt to determine the magnitude of the independent contribution to the systematic variance by each problem attribute.

8. The problem attributes are all of equal importance in selection of a management decision style.

Although there is no universally accepted definition of a successful leader, a vast majority of research that has attempted to define leader success has employed performance measures and subordinate satisfaction as criteria (Gibb, 1969; and Stogdill, 1973). These appear to be the consequences of the supervisor-subordinate relation that are of critical importance in discriminating between successful and unsuccessful leaders. Vroom and Yetton (1973) maintain that effective leaders conform more closely to their model than less effective leaders. In order to test this hypothesis, leaders will be assessed in terms of the Vroom-Yetton model and these measures will be related to performance ratings and subordinate satisfaction ratings. The following is hypothesized:

9. Conformity to the Vroom-Yetton model, as measured by the four leadership indices is significantly and positively related to performance and satisfaction.

As previously stated, one of the major objectives of this study is to gain additional understanding into the process of decision-making in leadership situations. The Vroom-Yetton model of leadership stipulates that leaders base their decisions concerning subordinate participation on eight problem attributes that are functions of the problem at hand, the leader himself/herself, the subordinate(s), and the situation. Hence, leaders must base their leadership decisions on a set of multidimensional attributes. The hypothesized process of leader decision-making

involves the subjective weighing of the attributes and then combining them in some way to reach a conclusion. The Vroom-Yetton model prescribes a somewhat complicated set of rules which guide the selection of a decision style by means of a multiple cut-off process. However, the preponderant question in this case is do leaders integrate data in this manner?

The multiple cut-off process is just one of many mathematical models that have been advocated as paramorphic representations of judgment processes. It is a nonlinear or noncompensatory model. This implies that the decision involves the consideration of many attributes, and the interpretation of a given attribute is conditional upon the state of the other attributes (Hoffman, 1968). Specifically, the presence of problem attribute A (Figure 1) will prescribe a participative decision style only when there is a predetermined combination of the other problem attributes. In contrast to this approach, many researchers have found that a linear or compensatory model is an adequate representation of decision making. The major difference between these two models is that in a compensatory model the interaction among the attributes is assumed to account for little variance.

Resolution of this question is complicated by the measurement problem that surrounds this model. In the past, management decision styles were measured by subjects responding to the "standardized cases." Utilizing this

method each subject must make two major judgments. First, he/she must analyze each case in terms of whether each problem attribute is present or not present. Then he/she must judge which management decision style is appropriate for that combination of problem attributes. Therefore, two independent sources of judgmental error are present in the final judgment. It can be argued that a large component of error variance in the selection of decision styles is being introduced by the subject's inability to reliably judge the composition of problem attributes from the case. If this is true, a subject may be attempting to respond in accordance with the normative model, only to have this masked by his or her misdiagnosis of which problem attributes are present. In addition, in the cases not all combinations of problem attributes are used, thereby confounding interactions. This study will present all combinations of the problem attributes in addition to the cases, thus enabling the examination of the subject's decisions without this first source of error and the unconfounded interactions. Using this measure, an attempt will be made to determine if subjects utilize the problem attributes in the stimulus sets in a configural manner as predicted by the normative model.

The following hypothesis is proposed:

10. There will be significant interactions among problem attributes in the use of the decision styles.

METHODOLOGY

Subjects

The subjects participating in this study consisted of 46 (44 males and 2 females) managers from two manufacturing companies located in the mid-western United States. Both companies operate under a Scanlon Plan and have a history of advocating manager development and participative decision-making. All management personnel from these two companies were invited to participate in this study in exchange for personal feedback and career counseling. The subjects' mean age was 40 years, average length of time at present job was five years, and average length of supervisory experience ranged from less than one year to 23 years with an average of nine. Organizational level of the subjects ranged from president to first level supervisor.

Description of the Measures

Data for this study were obtained by means of paper-and-pencil questionnaires covering leadership style, personality characteristics, subordinate satisfaction with the subject's leadership, and performance evaluation from

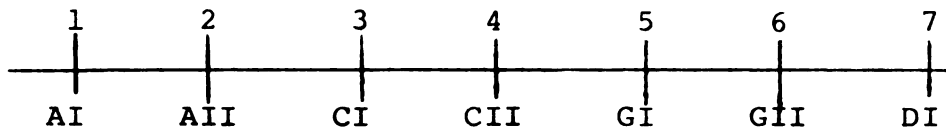
the subject's supervisor. Each of the measurement instruments are identified below.

The Case Studies¹ (Vroom & Jago, 1974). In order to assess the subject's leadership behavior, the 48 standardized cases developed by Vroom and his associates were employed. The development of Vroom's cases were discussed earlier in this paper and are outlined in detail in Vroom and Yetton (1973) and Vroom and Jago (1974). Briefly, the cases consist of short narratives which describe a typical leadership situation. Each case has been classified in terms of its problem attribute structure and its applicability to individual or group problems by expert judges. If all combinations of problem attributes were used for individual and group problems, 512 cases would result. To reduce the number of cases to a workable amount, five nesting principles and some sampling procedures were used (Vroom & Jago, 1974, pp. 756-767). Although confounding higher-order interactions, this procedure resulted in reducing the cases to 48 (24 group and 24 individual), while retaining the desirable property that main effects are orthogonal. A sample of the cases used in this study are presented in Vroom and Jago (1974, pp. 750-753).

The subjects were instructed to respond to each case independently on the set of management decision styles

¹This instrument was provided for use in this study by Dr. Victor Vroom and Kepner-Tregoe, Inc.

presented in Table 1. For the purpose of statistical analysis each management decision style was assigned the following integer value to construct an ordinal level of participation scale.



While no previous reliability or validity information is available on this problem set, an earlier problem set of 30 cases was found to have a corrected split-half reliability of .81.

The following measures were also derived from these cases:

1. Mean level of participation (MLP). This measure is indicative of the subject's average level of participation across the 48 cases. It is simply the mean of the scale values assigned to the management decision styles employed by the subject on the Cases.

2. Deviation from the MLP prescribed by the Vroom-Yetton model's least manhour criterion (DMLP). If a hypothetical leader responded to these 48 cases in a manner that perfectly conformed to the Vroom-Yetton least manhour criterion he/she would receive a MLP score of 3.46. A subject deviation score is computed by subtracting 3.46 from his/her MLP score, taking the absolute value and subtracting this value from 4. This score represents the

correspondence between the subjects' responses in terms of average participation and the model. Subjects who most closely resemble the model will receive the highest scores on this variable.

3. Variance in use of decision scales (VAR). This measure is indicative of the extent to which the subject varies his/her behavior when responding to the cases. This measure will be used to indicate the extent to which a subject responds to the contingencies of the situation. It is simply the variance of the scale values assigned to the management decision styles for each subject.

4. Deviation from VAR prescribed by the Vroom-Yetton model's least manhour criterion (DVAR). A hypothetical perfect Vroom-Yetton leader would receive a VAR score of 4.468 on the 48 cases. 4.468 is subtracted from the subject's VAR score, the absolute value is taken and this value is subtracted from 4. This score represents the correspondence between the subject's variance in responding to the cases and that prescribed by the model. Subjects who most closely resemble the model will receive the highest scores on this variable.

5. Agreement with the feasible set (AFS). This measure is indicative of the extent to which the subject responded to the cases in a manner that is congruent with the Vroom-Yetton model. It is computed by counting the number of cases in which the subject's response falls within the feasible set dictated by the model.

6. Agreement with the least manhour criterion (ALMC).

This measure is indicative of the extent to which the subject responded to the cases in a manner that is congruent with the least man-hour criterion which has been previously discussed. It is computed by counting the number of cases in which the subject's response is the same as the one dictated by the model.

The supervision scales of the Minnesota Satisfaction Questionnaire (Weiss, Davis, England, & Lofquist, 1967).

The Supervision-Human Relation and the Supervision-Technical scales of the Minnesota Satisfaction Questionnaire (MSQ) were employed to assess the level of subordinate satisfaction of each subject. Each scale consists of five Likert-format items which are purported to measure both intrinsic and extrinsic reinforcement dimensions of supervision. The scales were constructed on a sample of 1,793 workers employed in a wide range of positions and industries. The instructions and items were written to be applicable to all levels of organizations and have been found to conform to a fifth grade reading level. Extensive reliability, validity, and normative data are presented in the manual.

Hoyt reliability coefficients have been reported ranging from .95 to .71 with a median of .89 for the human relations scale and .86 for the technical scale. Test-retest reliabilities of .86 and .90 with a week interval and .66 and .68 for a one year interval are reported in the manual.

Evidence for construct validity has been reported by Dunham and Smith (1976). They concluded that the MSQ met all of Campbell and Fiske's (1959) criteria for construct validity when analyzed in conjunction with the Employee Attitude Research Survey, Job Description Index, and Faces Scale. Further construct validity evidence has been obtained in the form of the scale performing according to its theoretical expectations (Weiss, et al., 1967).

Personality Research Form (Jackson, 1967). The achievement, autonomy, cognitive structure, dominance, and order subscales of the Personality Research Form (PRF) were selected to measure relevant dimensions of the subject's personality. The particular dimensions were selected because they were judged to be components of personality that have considerable potential to shape supervisory behavior. This instrument was developed from a large amount of data surrounding Murray's personality theory and was constructed to describe personality comprehensively. Each scale consists of 20 true-false items that were developed utilizing carefully controlled quantitative procedures. Detailed descriptions of the construction and validation are presented in Jackson (1967, 1970).

Odd-even, Kuder-Richardson, and test-retest reliabilities for the scales cluster around .80 to .95. Construct validity has been reported in the form of significant correlation with comparable scales (California Psychological Inventory and Guilford-Zimmerman Temperament

Survey) and pooled peer ratings and self-ratings of appropriate dimensions (Anastasi, 1976). This measure has generally met criteria for convergent and discriminant validity using the multi-method factor analysis (Jackson & Guthrie, 1968).

The following is a brief description of a high level of each of the scales used in this study paraphrased from the manual.

Achievement--Aspires to accomplish difficult tasks, maintain high standards and work toward distant goals.

Autonomy--Breaks away from restraints or restrictions, is not dependent on others and may be rebellious.

Cognitive Structure--Does not like ambiguity or uncertainty in information and desires to make decisions on definite knowledge.

Dominance--Attempts to control the environment, influence others, and enjoys the role of leader.

Order--Concerned with keeping things organized; dislikes lack of organization.

Performance Evaluations

Performance data on the subjects were collected by means of supervisory ratings. The rating scale consists of three subscales: general appraisal, technical skills, and human relation skills. The scale was constructed for this study drawing items primarily from the Mixed Standard Scale (Blanz & Ghiselli, 1972). Two items from this scale were not used and five items were written to cover content areas that were not covered by the Mixed Standard Scale. There

are nine items in the General Appraisal Scale, six items in the Technical Skill Scale, and six items in the Human Relations Scale for a total of 21 items. The item format consists of three descriptions of various components of supervisory behavior. The descriptions were designed to describe three levels of performance on each selected behavior. Respondents checked the statement that most resembles the ratee. They could check one of the three statements or check between the first and second or second and third. With this procedure there are five possible choices on each item. Therefore, the hypothetical ranges of the scales are: General Appraisal 45 to 9, Technical Skills 30 to 6, and Human Relation Skills 30 to 6. This instrument is presented in the Appendix.

Problem Attribute Sets

Sixty-four hypothetical management situations were constructed by forming all possible combinations of six problem attributes defined in the Vroom-Yetton model of leadership. Problem attributes B, C, D, E, F, and G (see Figure 1) were utilized. Each problem was presented in the form of a table containing six of the questions presented in Figure 1. On the right side of the questions were two columns labeled Yes and No. A cross ("X") was placed in the Yes column if the problem attribute was present and in the No column if it was not present. Presented in Figure 3 is an example of the stimulus used for this instrument.

Problem Number 1	Yes	No
A. Do I have sufficient information to make a high quality decision?		X
B. Is the problem structured?		X
C. Is acceptance of decision by subordinates critical to effective implementation?		X
D. If I were to make the decision by myself, is it reasonably certain that it would be accepted by my subordinates?		X
E. Do subordinates share the organizational goals to be attained in solving this problem?		X
F. Is conflict among subordinates likely in preferred solutions?		X
Management Decision Style AI AII CI CII GII		

Problem Number 2	Yes	No
A. Do I have sufficient information to make a high quality decision?		X
B. Is the problem structured?	X	
C. Is acceptance of decision by subordinates critical to effective implementation?	X	
D. If I were to make the decision by myself, is it reasonably certain that it would be accepted by my subordinates?		X
E. Do subordinates share the organization goals to be attained in solving this problem?		X
F. Is conflict among subordinates likely in preferred solutions?	X	
Management Decision Style AI AII CI CII GII		

Figure 3. Example of the Problem Attribute Sets.

Presenting all possible combinations of the six problem attributes yield 2^6 or 64 situations. Each situation is presented twice producing 128 situations in the questionnaire. The situations were randomly distributed throughout the questionnaire with the limitation that there must be 25 situations between the two presentations of the same situation.

Preceding the problems in the booklets was a set of instructions that acquainted the subjects with the nature of this questionnaire, and gave a description of each of the problem attributes. The subjects were also informed that for each of these situations they were to assume that there was a quality requirement (problem attribute A) and that they were group problems. The subjects responded to the situation with the group management decision styles defined in Table 1.

The same six measures that were computed from the cases were computed for these sets.

Description of the Data Gathering

Following agreement between the prospective organizations and the investigator, letters were sent to appropriate managers soliciting their participation in this study. The general nature of the study and the extent of feedback they would receive was explained. They were informed that five hours of time over a period of two weeks would be needed in the data collection phase of this study.

The letter also stressed that all information obtained from the participants would be examined only by the researchers and would be held strictly confidential.

On a prearranged day all persons who wished to participate in this study were invited to an on-site morning meeting. In the meeting the investigator was introduced by the personnel manager and the investigator then explained the general nature of the study. The questionnaire packets were distributed and each component was reviewed. The subjects could examine all measures except the problem attribute sets. These were enclosed in separate sealed envelopes. It was explained to the participants that this packet contained descriptions of problem dimensions and it was important that these were not to be seen by them until all other components were completed. The investigator stressed the need to respond to all items as carefully and accurately as they could in order to make the feedback meaningful. A deadline was set allowing the subjects two weeks to complete the packets.

On that same day the performance evaluation forms were distributed to each subject's supervisor by the subject. The purpose of the form was explained and the supervisor was given a self-addressed stamped envelope to mail the form directly to the investigator.

The satisfaction with the supervisor scale was given to five of the subject's subordinates who were randomly selected prior to data collection by the company's

personnel department. In order to stress the confidentiality of the satisfaction ratings the subordinates were provided with self-addressed stamped envelopes to mail the scale directly to the investigator at his university address. The questionnaire packets were collected by the investigator after the two week period.

ANALYSIS OF DATA

The contingency aspects of the Vroom-Yetton Model were investigated by determining proportions of variance in decision style utilization that were attributable to both situational differences and individual leader differences. These proportions were found by submitting the subjects' responses to both the Cases and the Sets to two separate subject by situation analyses of variance. Since those analyses produced significant effects for both factors, the variance attributable to the individual subjects was further explored by relating five dimensions of the subject's personality and the Vroom-Yetton similarity indices by means of a multivariate multiple regression analysis. The usefulness of the personality dimensions in predicting leader effectiveness was also investigated by employing the five personality dimensions as predictors and, in the first regression analysis, the satisfaction scales as criteria. In the next regression analysis, the satisfaction scales were replaced with the three performance scales.

The descriptive properties of the Vroom-Yetton model were examined availing several different statistical

techniques. This study employed two methods of assessing the subjects' leadership decision process and relating it to the model. One method was the usual case studies and the other was the Problem Attribute Sets. The Set's reliability was examined by correlating the first and second presentation of each problem. The correspondence between these two assessment devices was examined by inter-correlating the Vroom-Yetton indices from each of them.

Subject agreement with the Vroom-Yetton model was explored by correlating each subject's responses with the LMC, examining the percent agreement with the feasible set and the LMC, and examining the correspondence between the subjects' average variance and the variance prescribed by the model. Subject conformity to the ten rules that are the foundation of the model were evaluated by computing the proportion of observed rule violation and expected rule violation based on random assignment of decision style, constrained by the mean distribution of decision style for each subject, and testing these differences with t-test for proportions. Vroom's past finding that leaders respond differently to group and individual problems was reviewed by computing the mean level of participation separately for group and individual problems and testing the differences with correlated t-test.

The relative importance of the problem attributes in leader decision-making was examined by a multiple regression analysis that employed average level of

participation (mean of the decision styles for subjects on each case) as the criterion and the eight problem attributes as the predictors. The hypotheses that all problem attributes are of equal importance in the selection of decision styles was tested by comparing the residual sum of squares computed from a regression equation that assumes all beta weights are equal (Rao & Miller, 1971). In addition, independent contribution of explained variance for each predictor was computed and tested for significance in a manner suggested by Overall and Spiegel (1969, pp. 315-317).

Validity of the Vroom-Yetton model's normative aspects were evaluated with canonical correlation analyses. Canonical correlation is a generalization of multiple regression which allows several criteria and a method for relating these criteria to a set of predictors (Cohen & Cohen, 1975). The canonical correlation is the maximum correlation between these two linear functions. Designating the Vroom-Yetton indices as independent variables and the performance and satisfaction data as dependent variables four separate canonical analyses were then performed to explore the relationship among the Vroom-Yetton index measure and effectiveness data.

Individual models of leader decision-making were examined by performing a Q-type principal components analysis with varimax rotation on a 128 X 44 correlation matrix (43 subjects plus the Vroom-Yetton LMC). The

decision to rotate four factors were based on Cattell's scree test (1966). To facilitate the interpretation of these components, separate analyses of variance were computed for each subject. A $2 \times 2 \times 2 \times 2 \times 2 \times 2$ (two levels of each of six attributes) fixed effects model was used for these individual subject analyses.

RESULTS AND DISCUSSION

Descriptive Properties of the Sample

Presented in Table 2 are the reliabilities, means and variances for the measures used in this study. The reliability for both the Cases and the Sets are extremely high indicating that the subjects were able to respond consistently on these instruments. The reliabilities for the satisfaction and the performance scales cluster around .70. This is an acceptable level of internal reliability suggesting that the subscales are assessing one general component of each of these constructs. However, the reliabilities for the personality dimensions range from .51 to .76 indicate that some of the dimensions are not tapping the single trait that was intended.

Organizational Differences

Although this study is not concerned with the effects of organizational structure on leadership behavior, it was decided that a brief look at the differences between these organizations on the Cases may be informative. Presented in Table 3 are the mean frequency use of decision styles on the Cases for both organizations participating in

Table 2.--Mean Frequency Use of Management Decision Styles
(Cases) for both Organizations Used in this
Study.

Decision Style	Organization A	Organization B	Total Mean Usage
A1	8.0	5.8	6.9
A11	4.3	2.0	3.2
C1	10.0	8.2	9.1
C11	8.4	8.0	8.2
G1	6.6	7.9	7.3
G11	6.4	11.9	9.2
D1	3.6	4.2	3.9

Table 3.--Mean Frequency Rule Violations for both Organization.

Rules	Organization A	Organization B
1	1.6	.7
2	.2	.2
3a	2.7	4.9
3b	.8	1.5
4a	.3	.2
4b	.6	.3
5	1.8	.7
6	1.1	.3
7	1.6	1.1
8	3.7	2.2
9	.6	.5
10	1.4	2.0

this study. The two groups of managers were very similar in their selection of decision styles with the only notable difference being a slightly greater preference for decision style G11 for organization B.

To examine the extent that members from both organizations complied with the Vroom-Yetton model, the mean rule violations were computed separately for both organizations and are presented in Table 4. Once again, there does not appear to be any major differences. There is, however, a slight trend for members of organization A to have more violations for rules designed to protect the acceptance of the decision (rules 5 through rules 8).

The results from these analyses indicated that members from both organizations responded to the Cases in substantially the same manner. Although, there are small, but consistent differences between these organizations, it appears that organizational variables were not having a major effect in the selection of leader styles. This is not a surprising result since the two organizations are, in fact, very similar and Vroom and Jago (1974) failed to find major differences in use of decision style when three distinct management groups were studied.

Contingency Aspects of the Model

Individual and situational differences. Contingency theories of leadership mandate that a leader's behavior is a function of both individual differences attributable to

Table 4.--Reliability, Means and Variance for Each Scale or Subscale in This Study.

Instrument	Subscale	Alpha	Mean	Variance
The Vroom- Yetton Case Study	Mean level of Participation (MLP)	.877	4.002	.330
	Deviation from Prescribed MLP (DMLP)	- -	3.127	.302
	Variance in Use of Decision Styles (VAR)	- -	3.404	.455
	Deviation from Prescribed VAR (DVAR)	- -	2.921	.418
	Agreement with the Feasible Set (AFS)	- -	34.565	12.918
	Agreement with the LMC (ALMC)	--	16.652	12.987
Satisfaction with the leader	Human Relations	.683	12.430	14.073
	Technical Skills	.768	21.951	17.776
The Person- ality Research Form	Achievement	.513	16.78	3.507
	Autonomy	.578	5.71	6.607
	Cognitive Structure	.541	12.56	6.429
	Dominance	.767	13.15	13.821
	Order	.530	13.67	7.202
Perfor- mance Evaluations	General Appraisal	.726	35.0	24.151
	Technical Skills	.768	21.95	17.776
	Human Relation Skills	.683	21.43	14.073
The Problem Attributes Sets	Mean Level of Participation (MLP)	.980	3.607	.565
	Deviation from Prescribed MLP (DMLP)	- -	2.975	.508
	Variance in use of Decision Styles (VAR)	- -	3.572	4.082
	Deviation from Prescribed VAR (DVAR)	- -	2.285	1.393
	Agreement with the Feasible set (AFS)	- -	94.652	126.943
	Agreement with the LMC (ALMC)	- -	40.478	151.100

the leader and differences attributable to the situation at hand. This assumption was tested by submitting the data to a subject by situation fixed effects analysis of variance and computing omega squared (ω^2). For the Cases a 48 by 46 (48 cases and 46 subjects) analysis of variance was computed and for the Sets a 128 X 44 analysis of variance was computed. The results of these analyses are presented in Table 5. Hypothesis 1 predicts that both individual and situational differences will account for significant variance in the selection of decision styles.

From Table 5 it may be observed that data from both the Cases and Sets verify this hypothesis. For both assessment instruments subjects tended to respond in a manner such that the different situations accounted for more variance in the employment of decision styles than individual differences among subjects. Past research using the Vroom-Yetton model has constantly demonstrated that, while both situational differences and individual leader differences account for a significant portion of the variance, situations accounted for about three to four times more than individual leader differences (Hill & Schmitt, 1977; Vroom & Jago, 1974; and Vroom & Yetton, 1973). The data from the Cases replicates this finding with about a 3.5 to 1 ratio. However, in the data from the Sets the proportion of variance accounted for by situations and individual differences is about equal. This is surprising since Hill and Schmitt found that the situation accounted

Table 5.--Overall Analysis of Variance for Subjects and Situations for the Cases and Sets.

	Source	SS	df	Ms	F	P	ω^2
CASES	Situations	2636.5924	47	56.097716	28.199	< .0005	.3485
	Subjects	713.9837	45	15.866304	7.976	< .0005	.0942
	Error	4207.4076	2115	1.989318			
SETS	Situations	3617.2095	127	28.481965	19.056	< .0005	.2409
	Subjects	3229.8743	43	75.113356	50.254	< .0005	.2151
	Error	8162.3530	5461	1.494663			

for 4.5 times more variance than did leader difference, using an assessment instrument nearly identical to the one employed here.

The results of these two analyses are similar and, for the most part, conform with past findings. However, for the sets the lesser variance attributable to the situational differences is important and may indicate that the subjects were responding to the Sets using a somewhat different decision strategy than when they were responding to the cases. Nonetheless, these results do support the notion that the situation plays an important part in the selection of leader decision styles.

Leader personality. Contingency theories of leadership imply that leader decision style is not a stable trait, but rather the product of the leader interacting with the environment. Consequently, such theories must contain the basic premise that the leader's personality is not a major determining factor in leadership style or effectiveness. In order to explore the relationship among leader personality, decision style and effectiveness, these data were inter-correlated and several multivariate multiple regression analyses were conducted. The intercorrelations of these variables are reported in Table 6. The correlations between AFS (Cases) and autonomy and ALMC (Cases) and autonomy are the only significant correlations among the Vroom-Yetton similarity indices and the personality dimensions.

Table 6.--Correlations Among Personality Variables and Leader Style, Satisfaction and Performance.

	Achievement	Autonomy	Cognitive Structure	Dominance	Order
CASES	AFS	.13	.39*	-.19	.12
	ALMC	.09	.32*	-.15	-.04
	DMLP	-.21	-.03	.19	-.01
	DVAR	-.06	-.07	.16	.09
SETS	AFS	.05	.04	.23	.19
	ALMC	.07	-.06	-.08	-.08
	DMLP	.03	.01	.05	-.03
	DVAR	.06	-.07	.16	-.09
Satisfaction	Human Relations	.05	-.13	-.03	.07
	Technical	-.09	-.10	.01	.09
Performance	General Appraisal	.19	.08	.04	.16
	Human Relation	.16	-.02	-.09	.04
	Technical	.10	.10	-.01	.00

*p < .05

To examine these relationships in greater detail, the five personality dimensions were employed as predictors and the Vroom-Yetton indices (based on the Cases) as criteria. The overall multivariate F -test, which tests the null hypothesis of no association between the predictors and criteria, was not significant, $F(20,126.6) = 1.21, p > .05$. The same analysis was repeated with the Sets indices substituted as criteria. Once again, the overall F -test was not significant, $F(20,123.7) = .83, p > .05$. The absence of a relationship between leadership style and personality lends more support to the validity of a general contingency model, which is an integral component of the logic of the Vroom-Yetton model.

The relationship between personality and leader effectiveness was examined in a similar manner by employing the personality variable as predictor in two separate regression analyses. In the first analysis in which the two satisfaction scales served as criteria, the overall multivariate F test was not significant $F(10,78) = .73, p > .05$. In the second regression analysis, the three performances measures were employed as criteria and, as predicted, no significant relation was found $F(15,104.3) = 1.0, p > .05$.

The failure to isolate significant relationships among these variables supports hypothesis 2. For this sample there appears to be no identifiable relationship among these personality variables, leadership style, or

effectiveness. While generalizing from nonsignificant results is not completely warranted, these analyses taken as a whole, offer strong support for the contingency aspects of the Vroom-Yetton model. Subjects do apparently employ leader decision styles that are systematically varied depending on situational elements. These styles appear not to be controlled by stable traits that in the past have often been associated with leadership style. However, there may be individual leader differences that control or influence leadership style that were not tested in this study. This issue was explored by a Q-type principal components analysis which is presented later in this section.

Descriptive Aspects of the Model

Correspondence between the Cases and Sets. In the past, three vastly different types of assessment instruments have been exploited to measure leadership style in terms of the Vroom-Yetton model. These are the recall method (Vroom & Yetton, 1973) standardized cases (Vroom & Jago, 1974) and problem attribute sets (Hill & Schmitt, 1977). The present study employed the latter two methods. The problem attribute sets are the newest and least used assessment method and therefore must be given special attention. Listed in Table 7 are the individual test retest reliabilities for all subjects. These were computed by correlating the first and second presentation of each problem. The reliabilities range from .25 to .98 with the

Table 7.--Individual Subject Reliability for the Problem Attribute Sets.

Subject	Reliability	Subject	Reliability
1	.32	24	.25
2	.53	25	missing data
3	missing data	25	.42
4	.69	27	.29
5	.61	28	.73
6	.62	29	.28
7	.60	30	.56
8	.98	31	.64
9	.69	32	.40
10	.54	33	.48
11	.40	34	.61
12	.57	35	.40
13	.72	36	missing data
14	.62	37	.74
15	.54	38	.60
16	.51	39	.39
17	.90	40	.52
18	.84	41	.60
19	.45	42	.48
20	.78	43	.26
21	.55	44	.42
22	.29	45	.74
23	.86	46	.49

*Three subjects are not reported due to extensive missing data.

majority in the .50 to .70 range. These are somewhat lower than Vroom and Yetton's (1973) estimate of .81 for a 30 case set, but are comparable to the reliabilities found for Hill and Schmitt's problem attribute sets. Given the complexity of the task these reliabilities are reasonably high and do suggest that this assessment instrument is useful in measuring leader decision styles.

The similarity between the Cases and Sets was examined by comparing the descriptive statistics and inter-correlating the four Vroom-Yetton indices, MLP and VAR from both measures. By inspection of Table 8 it can be observed that there is a high degree of correspondence among measures computed from the Sets and the Cases. Displayed in Table 9 is the correlation matrix constituted of measures from both the Sets and the Cases. The underlined correlations represent the relationship between the same measure computed from the Cases and Sets. MLP, AFS, DMLP, and DVAR all have moderately high correlations indicating that these measures exhibit convergent validity. However, the ALMC correlation of .17 is not significantly different from zero suggesting that these measures are tapping somewhat different decision-making behavior. Perhaps the most surprising correlation is the $-.38$ between the VAR measures. This indicates that subjects who employed higher levels of variation in selecting decision styles on the Cases use less variation on the Sets. Therefore, subjects were perceiving the Cases and Sets in some differential manner

**Table 8.--Summary Statistics for Leadership Measures from
Both the Cases and the Sets.**

Index	Statistic	Cases	Sets
MLP	Maximum	5.16	5.64
	Mean	4.00	3.67
	Minimum	3.04	2.37
VAR	Maximum	4.69	8.73
	Mean	3.40	3.57
	Minimum	1.21	.58
Percent	Maximum	50.00	55.55
AFS	Mean	72.57	74.11
	Minimum	85.42	98.84
Percent	Maximum	16.67	17.00
ALMC	Mean	34.69	32.28
	Minimum	47.92	53.12
DMLP	Maximum	3.98	3.97
	Mean	3.13	2.99
	Minimum	1.97	1.05
DVAR	Maximum	3.89	3.95
	Mean	2.20	2.28
	Minimum	.738	-1.72

Table 9.--Correlation Matrix for Both Cases and Sets.

	CASES						SETS					
	MLP	VAR	AFS	ALMC	DMLP	DVAR	MLP	VAR	AFS	ALMC	DMLP	DVAR
CASES												
MLP	1.00											
VAR	-.26	1.00										
AFS	.26	-.25	1.00									
ALMC	-.42	.11	.51	1.00								
DMLP	-.99	.28	-.27	.41	1.00							
DVAR	-.28	.99	-.24	.14	.30	1.00						
SETS												
MLP	.61	-.31	.03	-.28	-.62	-.50	1.00					
VAR	-.21	-.38	-.06	-.20	-.53	-.69	.66	1.00				
AFS	.17	-.03	.29	.03	-.16	.09	.09	.07	1.00			
ALMC	-.06	.18	.08	.17	.07	.16	-.45	.01	.30	1.00		
DMLP	-.57	.32	-.04	.12	.58	.33	-.97	-.65	.01	.52	1.00	
DVAR	-.29	.31	.01	.24	.29	.33	-.50	-.69	.09	.16	.52	1.00

in terms of diversity in use of decision styles. Nevertheless, the other measures demonstrate that the subjects were responding to the Cases and Sets in much the same manner.

Subject agreement with the Vroom-Yetton model. As an index of similarity between the responses of the subjects and the Vroom-Yetton model, the correlation between each subject's responses and the LMC for both the Cases and the Sets were computed. These correlations are displayed in Table 10. For the Cases the correlations ranged from .0 to .67 with a mean of .39. Of the 46 subjects 40 had correlations that were significant at the .05 level. The data from the Sets are very similar. These correlations range from .04 to .69 with a mean of .42. Thirty-seven of the subjects had a significant correlation with the LMC on the Sets. Correcting for lack of reliability in the subjects' responses to the Sets indicates many subjects were in substantial agreement with the model. A comparison of the subjects' performance on both the Cases and Sets reveal a moderate correspondence with some notable exceptions. Subject 21 received an extremely high correlation (.69) when responding to the Sets and a nonsignificant correlation when responding to the Cases. However, this subject is not representative of the norm and the correlation between the MLP measures of .61 is strong indication that there is a fair amount of conformity between these two measures.

Table 10.--Correlations Between the Subjects' Responses and the Vroom-Yetton Model (IMC).

Subject Number	Correlation with the Model on the Cases	Correlation with the Model on the Sets'	Subject Number	Correlation with Model on the Cases	Correlation with the Model on the Sets'
1	.00	.17	24	.36*	.30
2	.26*	.40*	25	.57*	Missing Data
3	.28*	Missing Data	26	.30*	.50*
4	.29*	.27*	27	.20	.50*
5	.33*	.44*	28	.50*	.50*
6	.50*	.10	29	.33*	.43*
7	.55*	.21	30	.39*	.41*
8	.46*	.55*	31	.51*	.41*
9	.64*	.59*	32	.34*	.45*
10	.21	.33*	33	.53*	.44*
11	.42*	.54*	34	.40*	.54*
12	.38*	.62*	35	.36*	.48*
13	.44*	.57*	36	.40*	Missing Data
14	.15	.24	37	.52*	.42*
15	.56*	.37*	38	.45*	.69*
16	.32*	.49*	39	.39*	.43*
17	.37*	.27*	40	.27*	.30*
18	.46*	.14	41	.67*	.21
20	.26*	.41*	43	.45*	.49(

Table 10.--Continued.

Subject Number	Correlation with the Model on the Cases	Correlation with the Model on the Sets'	Subject Number	Correlation with Model on the Cases	Correlation with the Model on the Sets'
21	.13	.67*	44	.48*	.48* (.40)
22	.37*	.26*	45	.53*	.65* (.73)
23	.25*	.58*	46	.04	.38* (.40)

* $p < .05$

^aValues in parentheses are the correlations with the Vroom-Yetton criteria corrected for unreliability in the subjects' responses.

Hypothesis 3 predicts that subject agreement with the Vroom-Yetton model as measured by the AFS and ALMC, will be greater than chance levels. For the following comparisons chance levels are defined as the expected values for the probabilities of agreement with the feasible set or least manhour criterion when management decision styles are selected randomly over the 48 Cases or 128 Sets. Average AFS (Cases) was 70.83 percent and the AFS expected by a random process was 40.0 percent. Average AFS (Sets) was 57.0 percent. Both are higher than chance and it may be concluded that the subjects were responding to both the Cases and Sets in a manner concurrent with the Vroom-Yetton model. The ALMC measure closely resembles the result obtained with the AFS. For the Cases the mean ALMC was 34.47 percent which is compared with a chance value of 14.28 percent. For Sets, the mean ALMC was 32.28 percent and the value expected from a random process was 20.0 percent. Both these scores are much higher than chance level, thereby confirming hypothesis 3.

Hypothesis 4 predicts that the VAR prescribed by the model will fall within the 95 percent confidence interval computed from the sample VAR. This interval was computed from a formula presented in Lindgren (1968, pp. 390-391). For the Cases the 95 percent confidence interval ranges from 2.19 to 5.9 and the value prescribed by the model is 4.47. For the Sets this interval ranges from 2.30 to 6.21 and the value prescribed by the model is 3.01.

For both Cases and Sets, the model value falls within this confidence interval. This analysis was originally intended to find the confidence interval in which there is a prescribed probability that that interval contains the population variance. As it is used here, the assumption has been made that if this model is valid, in terms of its descriptive properties, the variance prescribed for the model should be equal to the variance of the population of leaders. Given this assumption, hypothesis 4 is supported.

Rule violation. The Vroom-Yetton model is based on 10 rules, four are designed to protect the quality of the decisions, four are designed to protect the acceptance of the decision, and two to eliminate group or individual styles when appropriate. The identification of rule violations for each rule provides a clearer understanding of the basic agreement or disagreement with the model. The mean observed probability of violation of each rule was calculated by dividing the frequency of violation by the frequency of applicability of the rule within the Cases and Sets. Expected probabilities of rule violations were based on random assignment of decision styles constrained by the mean distribution of decision style in the Cases and Sets. These probabilities reflect the rule violation expected for a person who maintained the mean frequency of each decision style, but who did not discriminate among problems in the allocation of decision styles (Vroom &

Yetton, 1973, pp. 146-147). The difference between expected and observed is evidence for the discrimination between problems to which the rule is applicable and problems to which the rule is not applicable. A positive difference is consistent with the Vroom-Yetton model's prescriptions; a negative difference, inconsistent. The differences were tested for significance by t-test for proportions.

Presented in Table 11 are the results of this analysis. When responding to the Cases the subjects violated all rules except rules 3a and 3b (the goal congruence rules) significantly ($p < .05$) less than what is expected by random assignment. For the Sets all applicable rules except rule 4a (the unstructured problem rule) were violated significantly less than expected by random assignment. Rule 3a was, (the goal congruence rule) in fact, violated significantly more than chance level.

The results for both the Cases and the Sets are very similar and are, in general, supportive of the descriptive properties of the model. The only exception to this is rule 3 (a and b) for the Cases and rule 4a for the Sets. Rules 3a and b concern circumstances where the quality of the decision is important and the subordinate(s) do not share the goals. Rule 3a forbids the use of decision style G11 and D1 and rule 3b specified that in group problems G1 is also not recommended. The data from both the Cases and Sets suggest that these rules do not play a part in the subjects' decision strategies. It may be that the leaders

Table 11.--Comparison of Observed and Expected Probability of Rule Violation.

Rule ^a	CASES				SETS			
	Obs.	Exp.	t Value	Prob.	Obs.	Exp.	t Value	Prob.
1	.040	.145	3.55	<.01	.014	.199	5.88	<.01
2	.027	.082	2.37	<.05	. .	. .	. .	. .
3a	.198	.270	1.67	NS	.383	.248	-2.85	<.01
3b	.185	.150	-.25	NS	. .	. .	. .	. .
4a	.040	.408	8.65	<.01	.362	.454	1.25	NS
4b	.087	.217	3.55	<.01	. .	. .	. .	. .
5	.079	.217	3.54	<.01	.042	.241	5.59	<.01
6	.185	.408	4.71	<.01	.203	.456	5.16	<.01
7	.337	.580	4.70	<.01	. .	. .	. .	. .
8	.336	.580	4.71	<.01	.462	.752	5.82	<.01
9	.024	.232	6.10	<.01	. .	. .	. .	. .
10	.072	.360	6.86	<.01	. .	. .	. .	. .

^aDefinitions for the rules are presented earlier.

felt it was necessary to hold group meetings under these circumstances to work on the problem ownership issue. They may believe that the group process is powerful enough to change the subordinate's views without encountering a substantial risk to the quality of the decision.

Rule 4a recommends that when the quality of the decision is important, the leader lacks information, and the problem is unstructured, decision styles AI, AII, and CI are excluded from the feasible set. Since this rule was used significantly in the Cases and not in the Sets, it suggests that the subjects altered their decision strategy somewhat when responding to these two different assessment instruments.

Hypothesis 5 predicts that all 10 rules would be violated significantly less than chance level. This hypothesis was supported for all rules except rules 3 (a and b) and 4a (for the data from the Sets). Generally this analysis is supportive of the model.

Vroom and his associates have often reported that managers tend to violate rules to protect acceptance more frequently than rules to protect quality. This finding has been replicated several times (Hill & Schmitt, 1977; Vroom & Jago, 1974; and Vroom & Yetton, 1973). The subjects in this study violated rules to protect quality on the average of 9.5 percent of the time. Acceptance rule violation was 19.3 percent. Once again these results concur with past

research. They suggest that the usual leader is more concerned with quality than acceptance.

Individual and group problems. The Vroom-Yetton model stipulates that managers behave differently in individual and group situations. To assess if the subjects do, in fact, discriminate between group and individual problems, the mean frequency of each decision style was computed separately for the two types of problems. A repeated measure t-test was computed on this data. Hypothesis 6 predicts that the decision styles that are theoretically applicable to only group problems (CII and GII) will be used significantly more on group problems than individual problems. Hypothesis 7 further predicts that decision styles theoretically applicable to individual problems (GI and DI) will be used significantly more on individual problems than group problems. It is also implicitly expected, although not formally predicted, that management decision styles that are theoretically applicable to both group and individual problems will not significantly differ in their use between group and individual problems.

Presented in Table 12 are the results of this analysis. As forecasted in hypothesis 6, decision styles CII and GII were employed significantly more in group problems than in individual problems. While hypotheses 6 and 7 were both supported, an unambiguous interpretation of these findings is not possible. From Table 12 it can

Table 12.--Frequency of Decision Styles for Group and Individual Problems.

MDS		Group Problems	Individual Problems	t Value*	Probability
A1	1	2.326	4.630	-8.05	< .001
A11	2	1.652	1.804	-.60	< .55
C1	3	3.891	5.261	-2.84	< .007
C11	4	7.369	.891	18.37	< .001
G1	5	2.391	6.978	-16.05	< .001
G11	6	8.196	.826	12.59	< .001
D1	7	.3261	3.609	-10.42	< .001

be seen that the subjects utilized decision styles A1 and C1 significantly more on individual problems than group problems. This outcome is not congruent with the model and suggests that the discrimination between group and individual problems does not conform specifically to the model. Another interesting aspect of these results is that they replicate exactly the findings of Vroom and Jago (1974). However, they concluded that their subjects were making a distinction concurrent with the model. What is not stated is that the directions to the Case studies draw the respondent's attention to the distinction between group and individual problems and the decision styles for group and individual problems are listed separately (see Table 1). Hence, the significant use of decision styles C11, G1, G11, and D1 in the present study and in the Vroom and Jago study in the predicted way may be a consequence of the subjects' conforming to the directions rather than a meaningful discrimination in leader decision-making.

The data in Table 12 also indicates that the participants in this study were more inclined to avoid the autocratic decision styles in group problems than in individual problems. This may be attributable to the leader's perception that when dealing with a group problem there is a greater probability that new information or greater commitment is possible when the group is brought together.

Importance of the problem attributes. The Vroom-Yetton model assumes that leaders base decisions about the amount of participation they will afford their subordinates on eight situational factors labeled "problem attributes." Furthermore, the model assumes that all problem attributes are of equal importance in making these decisions. However, past research has suggested that some of the attributes may be more important to managers in selecting their decision styles. In order to examine this issue, a multiple regression analysis was performed. Average level of participation on each case, that is, the mean of the decision styles for all subjects on each case, was the criterion and the eight problem attributes (coded 1 or 0) were the predictors. The squared multiple correlation of .4554 indicated that about 45 percent of the systematic variance in the average level of participation can be attributed to the presence or absence of all the problem attributes. This significant multiple correlation, $F(8,89) = 4.076$, $p < .001$, is important evidence supporting the model. It indicates that there is a significant relation among the presence or absence of the problem attribute and the selection of a decision style.

Hypothesis 8 predicts that there are no significant differences among the problem attributes used to select the management decision styles. This hypothesis is analogous to the hypothesis that the beta weights for each predictor (problem attribute) are equal. This was tested

by defining a new regression equation which imposed the restriction that all beta weights were equal to unity and comparing the residual sum of squares from this equation to the residual sum of squares from the original regression equation. The difference between these sums of squares were tested for significance by an F-test suggested by Rao and Miller (1971). A significant difference was found between the two sums of squares, $F(8.39) = 3.317$, $p < .01$, therefore, hypothesis 8 was not supported. It appears that some of the problem attributes were more important in the selection of decision styles than others. To further examine this issue the independent contribution of each problem attribute was determined by computing the semi-partial correlations between the criterion and each of the predictors and testing for significance using the general F-test for the simultaneous model. Presented in Table 13 are squared semi-partial correlations and the F-test for each problem attribute. Individually, only leader information, importance of acceptance, prior probability, and goal congruence accounted for significant independent contribution to the multiple correlation. Specifically, goal congruence seems to be the most important problem attribute. It independently accounts for about 15 percent of the variance which is considerably more than any other problem attributes.

The past several analyses have provided substantial, although not unequivocal, support for the descriptive

Table 13.--The Unique Contribution of the Problem Attributes to Average Level of Participation.

Problem Attributes	Squared Semi- Partial Corr.	F Value*	Probability of Significant
A Quality Requirement	.019	1.291	NS
B Leader Information	.062	4.212	.01
C Structure	.010	.679	NS
D Importance of Acceptance	.057	3.465	.01
E Prior Probability	.081	5.500	.01
F Goal Congruence	.150	10.190	.01
G Subordinate Conflict	.015	.951	NS
H Subordinate Information	.013	.883	NS

*df = 7/35

properties of the Vroom-Yetton model. It appears that leaders vary the use of decision styles in a manner that loosely fits the model. Perhaps the most convincing evidence comes from the rule violation analysis. Here the subjects are unaware of the formal rule structure of the model. The rules are applied to the subject's responses controlled for his/her level of participation. The relatively low rule violation for most of the rules indicates that the subjects did have a set of criteria upon which they based their decisions concerning use of management decision styles. These criteria are approximated by Vroom and Yetton's rules.

Nonetheless, there are components of the model that were not supported by these analyses. It appears that the goal congruence rules are not used by typical leaders. There is also some question about validity of the individual and group problem distinction. Data here suggests that the subjects' distinctions between types of problems do not conform to the model. In addition, it was suggested that past evidence supporting the group and individual descriptive properties could be attributed to method variance rather than a meaningful discrimination on the part of the subjects. It was also demonstrated that not all problem attributes were of equal importance in the selection of decision styles. The implication of this result is that certain problem attributes are more important to the leader and therefore should be given more prominence in the model.

The present study has produced data both supporting and refuting portions of the descriptive properties of the Vroom-Yetton model. However, many of the most critical tests, i.e., percent of subjects' agreement with the model, rule violations, and relation among the problem attributes and the use of decision styles, were supportive of the model. The evidence that failed to support the model involved less substantial concerns. Therefore, it would seem correct to conclude that the most basic descriptive properties of the model have been confirmed, but several of the details need to be reformulated or omitted. Use of all eight attributes that the model demands may be beyond the capacity of typical leaders.

Normative Aspects of the Model

Validity of the Vroom-Yetton model. The previous analysis and discussion was primarily concerned with the descriptive properties of the Vroom-Yetton model. The focus of the study will now be somewhat altered to concentrate on the normative aspects of the model. Here, the major question is, whether or not managers whose leader decision pattern resembles the Vroom-Yetton model superior to those managers whose decision pattern is discrepant from the model. For the purpose of describing the following analyses, superiority is defined in terms of supervisory performance ratings and subordinate satisfaction ratings.

Displayed in Table 14 are the zero order correlations among the Vroom-Yetton indices and the criterion sets and the intercorrelations among the criterion sets. For most of the indices the correlations are much lower than expected and in some cases are in an unexpected direction. The only significant correlation for the indices derived from the Cases is between AFS and performance-general appraisal. For the Sets, AFS is significantly correlated with both performance-general appraisal and technical skill scales. However, all three performance subscales are significantly negatively correlated with DMLP. The results suggest that subjects whose average levels of participation corresponded with the model (LMC) were perceived as lower performers by their supervisors. It should be pointed out that since this is a discrepancy measure, it does not evaluate the relationship between level of participation and performance. The correlations between MLP (Sets) and the three performance scales of .37, .35, .31 do indicate that for this sample the subjects who exhibited the greatest levels of participation were also perceived as being the best performers. In terms of satisfaction with the leader only the correlation between DVAR (Sets) and technical skills was significant. Hypothesis 9 predicts that leaders who more closely resemble the Vroom-Yetton model, as measured by the four Vroom-Yetton indices (DMLP, DVAR, AFS, ALMC) will receive higher scores on the performance and satisfaction measures. This hypothesis was tested by

Table 14.--Correlations Among the Vroom-Yetton Indices and the Criterion Sets.

	Cases				Sets				Performance				Satisfaction			
	AFS	ALMC	DMLP	DVAR	AFS	ALMC	DMLP	DVAR	GA	HR	TS	T	HR	T	HR	T
<u>Performance</u>																
General Appraisal	.25*	.15	-.16	-.08	.28*	-.18	-.32*	-.09	1.00	.81	.80	.30	.49	.30		
Human Relations	.14	.14	-.16	.03	.01	-.16	-.31*	.05	.81	1.00	.72	.35	.48	.35		
Technical Skills	.16	.15	-.12	.01	.26*	-.11	-.36*	-.05	.80	.72	1.00	.27	.37	.27		
<u>Satisfaction</u>																
Human Relations	-.04	.16	-.02	.01	.00	.01	-.06	.04	.49	.48	.37	.86	1.00	.86		
Technical	-.06	.06	.07	.09	.03	.08	.06	.22*	.30	.35	.27	1.00	.86	1.00		

computing a series of canonical correlation analyses. Summary statistics for the canonical variates are presented in Table 15. Four separate canonical correlation analyses were undertaken. Since this study is concerned with investigating the effect of leader decision style on effectiveness, the Vroom-Yetton index measures were designated the independent variables and satisfaction and performance measures as the dependent variables. The satisfaction dependent measures were examined first. This analysis revealed one significant canonical variate for the Cases and none for the Sets. The canonical correlation for the Cases was .5679 and for the Sets was .3679. While the squared canonical correlation can be interpreted as the overlap between the criteria and predictor sets, Cooley and Lohnes, (1971) suggest this may not be meaningful if the canonical variates are not an important factor of their respective batteries. However, Steward and Love (1968) have advocated an expression that indicates the degree of relationship between the batteries called the index of redundancy. The index of redundancy is the proportion of variance extracted by a canonical factor, i.e., a composite index of dependent measures, times the proportion of shared variance between the factor and the canonical factor of the independent measures (Cooley & Lohnes, 1971). For this analysis, the percent of variance in the composite index of satisfaction with the leader explained by the set of Vroom-Yetton similarity indices was 15.6 for the Cases and 7.6

Table 15.--Canonical Correlation Analyses Between the Vroom-Yetton Indices and the Criterion Sets.

Independent Variables	Canonical Weights	Structure Coefficients	Dependent Variables	Canonical Weights	Coefficients
AFS (CASES)	.2496	.876	Human Relations SAT	-.7631	.583
ALMC (CASES)	-.3731	-.166	Technical Skills SAT	1.5727	.920
UMLP (CASES)	.3813	-.209			
DVAR (CASES)	.2543	-.131			
Canonical Correlation = .5452					
Chi Square = 15.2771, df = 8, p = .05					
AFS (SETS)	.0092		Satisfaction	-1.4954	
ALMC (SETS)	.2304		Human Relations	1.9163	
DMLP (SETS)	-.0648		Satisfaction		
DVAR (SETS)	.9741		Technical		
Canonical Correlation = .3679					
Chi Square = .7491, df = 3, p = .56					
AFS (CASES)	1.0286		Performance	1.5936	
ALMC (CASES)	-1.0793		General Appraisal	-1.4142	
DMLP (CASES)	1.0408		Performance	-.6643	
DVAR (CASES)	-.527		Human Relations		
Canonical Correlation = .309					
Chi Square = 7.7875, df = 12, p = .8					
AFS (SETS)	1.0613	.876	General	1.4931	.647
ALMC (SETS)	-.5422	-.166	Appraisal Performance	-1.3348	.091
DMLP (SETS)	.1843	-.209	Human	.2974	.519
DVAR (SETS)	-.2354	-.31	Relations Performance		
Canonical Correlation = .5679					
Chi Square = 21.543, df = 12, p					
			Technical		
			Skill Performance		

for the Sets. While this is not a great amount of overlap, it does represent significant shared variance. The analysis does demonstrate that there is a marginal relationship between the Vroom-Yetton indices and the satisfaction measures. Substantive interpretation of the variate can be made by the examination of the canonical weights and structure coefficients for the significant analysis. Structure coefficients are simply the zero-order correlations between a variable and a canonical variate (Cohen & Cohen, 1975). Here the technical skill scale has a positive loading of substantial magnitude and the human relation scale has a moderate negative loading. This indicates that these two constructs relate differently to the battery of Vroom-Yetton similarity indices. The independent variate is about evenly loaded on DMLP and DVAR and moderately negatively loaded on ALMC for the Cases. However, the structure coefficients reveal that the AFS is relating differently to the canonical variate than the other independent measures. In a similar manner, the structure coefficients for the dependent variate shows that both are positively related to the canonical variate with technical skills predominating the relationship.

This analysis indicates that the human relation component of satisfaction with the leader is related to AFS and the technical component of satisfaction is related ALMC, DMLP, and DVAR. It should be noted that, in this analysis, the opposite signs associated with the canonical

weights do not denote an inverse relation between the variables. They are the consequence of the suppression effect due to the relatively high intercorrelation among a set of variables.

Two more canonical correlation analyses were performed employing the Vroom-Yetton indices as independent measures and the three performances scales as dependent measures. The canonical correlation for the cases is .309, which is not significant. The canonical correlation for the Sets is .5679 which is significant. Only one canonical variate was significant. The index of redundancy is 15.03 for the Sets and 6.04 for the Cases.

Again there appears to be a polarization of the two sets of variables. The performance scales of general appraisal and technical skills are similarly loaded on the dependent variate and are related to AFS in the independent variate set. The performance scale human relation is related to ALMC, DMLP, and DVAR in the dependent variate set. Furthermore, these two composites of variables are differently related to each other.

For the two sets of dependent variables, the results from the Cases and the Sets failed to replicate one another, with the analysis of the Cases producing significant results for the satisfaction data and the analysis of the Sets yielding significant results for the performance data. In addition, those significant relationships which were found were not large in the sense of shared variance.

Consequently, any interpretative statements must be made cautiously. With this in mind, it appears that these analyses produced some interpretable results. For both the performance and satisfaction data, AFS was related to the technical skills component. On the other hand, the ALMC, DMLP, and DVAR were related to the human relations component of both variable sets.

It had been assumed that an effective leader would receive high ratings on both performance and satisfaction measures, and that his/her leader decision style would be similar to the Vroom-Yetton model. However, given the results of the canonical analyses, it may be speculated that a leader may not be able to be high on all components of subordinate satisfaction and superior performance ratings. It appears from these analyses that leaders who resemble the Vroom-Yetton model are perceived in general, as superior leaders. However, this is not absolute, but rather a conditional conclusion. Leaders who resemble the Vroom-Yetton model as defined by the LMC seem to be superior on the human relations aspects of leadership but not necessarily on the technical skills aspect. On the other hand, leaders who resemble the Vroom-Yetton model as defined by the feasible set, disregarding the LMC, seem to be associated with superior technical skills or general appraisal but not necessarily with the human relation skills.

Although all relations found in the canonical correlation analyses are marginal, they do suggest that

do suggest that conformity to the Vroom-Yetton model is related to leader effectiveness. Hypothesis 9 is therefore partially supported. It is only partially supported in that while there apparently is a relationship between the Vroom-Yetton model and effectiveness, the exact nature of that relationship is unclear. In addition lack of association among these criteria and the indices is surprising and casts doubt on the validity of the model. However, because of the small sample size, further data relevant to this question should be collected.

Models of Leader Decision-Making

Previous analyses have demonstrated that both the situational aspects of leadership problems and individual differences attributed to the leader are important in terms of explaining responses to leadership situations. Other data have suggested that leaders are using different strategies and methods to solve problems. In order to identify if the subjects in the present study are utilizing common decision-making strategies, a Q-type principal component analysis of the subject's responses to the Sets was computed. This analysis yielded four components by Cattell's scree criterion (1966). Results of this analysis are reported in Table 16. It should be noted that three subjects were deleted from this analysis due to a large amount of missing data.

Table 16.--Q Type Rotated Principal Components Solution.

Subjects	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
VY (LMC)	.31676	.42233	.60688*	.20232
1	.13010	.00811	.15582	.43611*
2	.64466*	.06075	.23247	-.07176
4	.70026*	-.09863	.15947	.15468
5	.48812	-.14291	.53347*	.22053
6	.02289	-.14743	.12400	.84637*
7	-.09083	.18068	.13400	.71796*
8	.57586*	.34248	.34125	-.07782
9	.20026	.02307	.59985*	.52410
10	.70906*	.25162	-.02804	-.18835
11	.23886	.33783	.57260*	-.00049
12	.23786	.50876	.54772*	-.03554
13	.64804*	.14993	.52423	-.04708
14	-.07141	.74961*	.01320	-.10117
15	.64844*	.12502	.16638	.08167
16	.15957	.34764	.59195*	.03786
17	.59763*	-.29291	.25310	.43442
18	.60227*	-.12156	.17311	.17270
19	.64853*	.25937	.10137	.05506
20	.58822*	.46975	-.05668	.27267
21	.33355	.50226*	.40853	.29963
22	-.15683	.51326*	.19703	.04193
23	.31845	.50890	.59754*	.00532
24	.37718	.53181*	-.00282	.20616
26	.4688)	.43066	.18216	.19822
27	.43728*	.17565	.23895	.20822
28	.06238	.16239	.67427*	.34478
29	.42385	.10985	.46372*	.03712
30	.53081*	.47534	.11922	-.14245
31	.12454	.61809*	.25052	.21512
32	.08393	.34691	.47386*	.16781

Table 16.--Continued.

Subjects	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
33	.16694	.12844	.25345	.71771*
34	.51192*	.21585	.48909	-.11858
35	.60173*	.36871	.21707	.09039
37	.56360	.48044	.18907	-.20960
38	.21374	.26003	.58507*	.27932
39	.53873*	.13337	.27839	.15508
40	.29241	.67342*	-.06160	-.20841
41	.28023	.25513	.35768*	-.56604
42	.24229	-.09194	.58935*	.25862
43	.36349	.51350*	.27051	.05520
44	.53109*	.49316	.13605	.06367
45	.28620	.61635*	.50109	-.09651
46	.44158*	.20175	.22047	.44041
Eigenvalue	15.212	4.382	2.943	2.216
Percentage Variance	33.8	9.7	6.5	4.9

Note: Principal components loadings are result of varimax rotation. The asterisk (*) indicates the component on which a given subject has his/her highest loadings.

The large general component accounting for about 34 percent of the variance indicates that subjects are perceiving these problems in the same manner. There are, however, three other additional components which account for a relatively large portion of the variance.

In an effort to understand the nature of these differences among subjects and to identify models of leader decision-making, a $2 \times 2 \times 2 \times 2 \times 2 \times 2$ (two levels of the six problem attributes from the Sets) fixed effects analysis of variance was computed for each subject. The results of these analyses of variance are summarized in Table 17. Omega-square values are reported only for significant effects in the analysis of variance. Because of the large number of F-tests, an alpha level of .01 was employed.

Examination of Table 17 indicates some fairly substantial differences among the four groups of subjects. In general, the first group tends to make major use of prior probability and subordinate conflict and moderate use of importance of acceptance and goal congruency. Persons in this group also appear to be making more interactive use of problem attributes than subjects in other groups. This group's emphasis on prior probability and subordinate conflict and lack of emphasis on leader information, problem structure and goal congruence seems to indicate that they are more concerned with insuring the acceptance of decisions or avoiding conflict than insuring high quality decisions. These people may perceive effective

Table 17.--Omega Square Values for Significance Main Effects and Significant Intereactions for Each Subject.

	Subject	Leader Information	Structure	Importance of Acceptance	Prior Probability	Goal Congruence	Subordinate Conflict	2-Way Interactions	3 or More-Way Interactions
Component 1	2	2.7		5.9	10.1	5.9	26.2	24.0	5.0
	4	1.6		10.0	2.8	6.2	11.8	24.1	5.0
	8	3.2	1.8	12.1	22.6		8.1	14.1	21.1
	10	2.6			13.7		37.7		
	13			29.7	21.5	3.7	13.8		
	15			3.5	23.4		14.0		
	17	.1		3.8	3.8	51.4	3.8	20.7	6.5
	18			8.9	6.6	6.6	4.7	32.3	26.5
	19				21.5	2.9	10.5	10.6	
	20		1.6		65.0	1.3	1.6	5.9	
	26	6.3			30.3		2.7		2.7
	27	7.9			10.6	3.7	3.3		
	30	4.1	2.8	2.1	19.4	2.8	18.4	2.1	2.1
	34	4.3		17.6	15.8		13.3	6.1	
	35	5.3		3.9	30.6		4.4		
	37	2.4	3.9	3.9	29.4		23.4		4.5
	39	5.6		7.9	7.1	7.1	8.8		4.2
	44	5.9	5.9		23.7		3.4		4.0
	46			7.6	18.3			10.0	
Component 2	14	3.2			15.3	27.0		6.9	
	21	19.5		11.8	23.0	1.8		2.7	
	22	5.4				3.4			16.8
	24	5.9			27.8				
	31	17.9	3.1	4.1	17.9	6.5		12.7	2.2
	40	9.1	2.9		20.0	12.7	5.7	2.3	
	43	9.8		6.3	19.0				
	45	25.5	5.6	17.8	4.3	2.6		2.7	1.5
Component 3	VY								
	5			20.8	6.0	16.3	2.7	6.9	
	9	8.0		23.3	6.5	13.6	3.8	11.0	
	11	6.3	6.7	21.1	5.4				
	12	15.2	6.5	18.5	11.4			2.6	
	16	3.7		31.9	10.2			5.4	
	23	6.8	6.8	36.6	24.9	1.6		1.4	3.7
	28	3.7	2.1	35.0	4.7		5.8	16.1	6.2
	29			15.5	9.0		5.6		
	32	21.1		14.1				7.6	
	38	2.1	10.6	12.9	14.6	4.1	2.1	14.1	
	41			17.4		17.4	19.4		4.7
	42	3.4	5.5	24.5		12.6			
Component 4	1				18.9	8.2	6.1		
	6				3.2	29.5	21.4	9.9	
	7	7.2				3.0	1.0	24.2	9.0
	33	4.1		2.8	13.1	21.5	10.1	4.1	

leadership as facilitating supportive relations between themselves and their subordinates and among the subordinates. Therefore, this component can be labeled a high human relation oriented decision strategy.

The subjects in component 2, on the other hand, tend to rely most heavily on leader information and prior probability with moderate usage of goal congruence. There was almost no reliance on subordinate conflict and there was only moderate use of interactions. This group seems to be focussing more on their own influence as a leader than on subordinate characteristics. It may be speculated that this group views effective leadership in terms of maximizing their own influence on the group in order to create and obtain subordinate acceptance.

The Vroom-Yetton LMC loads most heavily on the third component. Persons in this group relied most heavily on importance of acceptance but also a moderate use of all the problem attributes. This is perhaps the most distinguishing characteristic of this group. This is also consistent with the fact that the Vroom-Yetton LMC loaded in this group. The model stresses the use of all the problem attributes and hence can be labeled a Vroom-Yetton or equal use component.

The fourth component is composed of just four subjects who utilized the goal congruence problem attribute and to a lesser extent prior probability. There does not

seem to be a clear basis on which to interpret or label this factor.

One advantage of the Sets was that no nesting of problem attributes was necessary, thereby, allowing a completely crossed design. This makes the examination of all interactions possible. Sixty-six percent of all the subjects used the problem attributes interactively. On the average, the interactive use of problem attributes accounted for about 10 percent of the systematic variance in their responses. Since the total variance accounted for by the use of the problem attributes was around 50 percent, the interactive use is substantial. A better understanding of a leader's decision-making policy can be obtained by knowledge of their interactive use. Hypothesis 10 predicts that there will be significant interaction among the problem attributes. The average number of significant interactions per subject was 3.77 accounting on the average for 9.44 percent of their variance. While this is not a large proportion of the total variance it does compare favorably with the amount of variance accounted for by the main effects for individual problem attributes. It appears that subjects are utilizing the problem attributes interactively, thereby supporting Hypothesis 10.

SUMMARY AND CONCLUSIONS

In the present study, several aspects of the Vroom-Yetton model of leadership decision-making were examined in order to test the validity of this theory. Important components of the model are the contingency assumptions, descriptive properties and the normative properties. The contingency assumptions of this model were generally supported by the results of this study. It was found that the variance attributable to situational differences and individual leader differences was significant, and that the situational differences were more important in explaining responses to both Vroom-Yetton cases and problem attribute sets. This confirms past findings and supports the position that leadership style is systematically varied depending on situational characteristics. In order to procure a better understanding of these individual leader differences, which apparently do affect the leader decisions, five of the leaders' personality characteristics were measured. For these subjects no significant relationships were found among the personality variables, the Vroom-Yetton similarity indices, and leader effectiveness. However, another attempt to explore this question proved more fruitful.

The Q-type principal components followed by the analysis of variance produced four subject factors based on individual leader decision strategies. The leader components differed most notably in the number, combination, and interactive use of the problem attributes in selection of decision styles. From inspection of the amount of variance accounted for by each problem attribute in the selection of decision styles, three of the leader components defining common decision strategies, were clearly interpretable and labeled human relations, leader influence, and Vroom-Yetton usage. These findings suggest that the individual leader differences are due to personal preferences in decision-making strategies in terms of the usage of influence and power, rather than to stable traits associated with one's personality. These results are completely consistent with a general contingency model of leadership.

The proportion of variance in selection of decision styles attributable to situational differences was explored by examining the descriptive properties of the Vroom-Yetton model. All in all, the results of this study were supportive of many of the descriptive properties of the model. Data from both the Cases and the Sets demonstrated that leaders apparently do make decisions based on the problem attributes and these decisions are fairly consistent with those suggested by the model's LMC. The responses to the Cases and Sets agreed with the Vroom-Yetton model much more often than would be expected by

chance, and correlations with the Vroom-Yetton LMC were substantial. It should be noted, however, that correlations with the Vroom-Yetton model were considerably less than perfect, that percentages of agreement with the LMC and FS were much less than 100 percent, and that most subjects' mean level of participation was higher and variance scores were lower than that suggested by the model.

Perhaps the most convincing evidence supporting the descriptive properties of this model originates from the rule violation analysis. This analysis demonstrated that ten of the twelve rules applicable to the Case and five of the seven rules applicable to the Sets were violated at significantly less than chance levels. Consequently, most of the relationships among the problem attributes and the use of decision styles prescribed by the model were exhibited by these subjects. It appears that leaders do have a set of criteria that they avail in order to regulate their selection of leader decision styles and these criteria are approximated by Vroom and Yetton's rules. The most important exception to this general conclusion concerns the goal congruence rule. The problem with this rule centers on the leader's use of decision style G11 in situations where this rule excludes it from the feasible set. The explanation for the discrepancy, as was previously noted, may be that when goal congruence is an issue, leaders perceive a need to process a problem in a group forum. It may be hypothesized that this particular situation is one

in which leaders are likely to overestimate the amount of control allocated to the group. In other words, although a leader has called a meeting of appropriate subordinates, and facilitated group processing by minimizing her/his role as the leader, that leader may still be maintaining control of the decision process by using informal means. However, because the leader plays down the leader role, he/she may report using decision style GII, when, in fact, he/she actually employed GI. If this is the case, then the problem is not with the descriptive properties of the rule, but rather in the leaders relating their own behavior to the management decision styles. It is precisely for this reason that Argyris (1976) objects to relying solely on self-reported behavior, rather than observed behavior, to assess leadership style. The assumption that a leader can actually report what decision styles were actually employed in different situations is at this time untested. To investigate this issue actual behavior must be observed and then compared with written reports from the usual instruments. While the proposed study would be difficult, it is not impossible for a limited sample.

Rules 9 and 10 are concerned with the correct selection of the decision styles in group and individual problems. The rule violation analysis supported the validity of these rules. However, the veracity of this portion of the analysis is questionable due to significant differences for decision styles not associated with one of

these classifications of problems and the possibility that the directions for the Cases force this distinction on the subjects. In order to resolve this problem the Cases with altered directions and display of decision styles will have to be administered to a new sample.

It was also found that not all of the problem attributes were receiving equal consideration in the decision-making process. Although there are individual differences in the utilization of the problem attributes, most subjects relied primarily on one or more of the following problem attributes: leader information, importance of acceptance, prior probability of acceptance, goal congruence, and subordinate conflict. The problem attributes, quality requirement, problem structure and subordinate information were usually not utilized by the leaders in this study.

These findings concur with past studies (Hill & Schmitt, 1977; and Vroom & Jago, 1974) in that the problem attribute "Problem Structure" is not typically utilized by leaders to select decision styles. This is the only problem attribute that has repeatedly not accounted for significant variance either with the Cases or the Sets. This is a surprising result since on a conceptual level a problem that has been well defined or has an established procedure for acting on it should be handled in a different manner than problems that lack these qualities. In the model, the only rule that utilizes this problem attribute

is rule 4 (a and b). This rule states that if the decision has a quality requirement, the leader lacks the necessary information and the problem is unstructured then decision styles that do not require subordinate-leader interaction are eliminated from the feasible set. Since this rule was violated less than expected for Cases, although not for the Sets, it appears that, in general, the subjects were making the discrimination required by the rule but were not relying on the problem structure attribute to do it. Possibly the subjects are perceiving this problem attribute as a component of leader information rather than an independent bit of information. As used here, an unstructured problem is one aspect of the leader not possessing the proper information. Therefore, the subject is able to respond in a manner that conforms with the model without use of this problem attribute. It may be concluded from this analysis that the problem attribute "problem structure" is not used by typical leaders independently from leader information and therefore does not conform to the descriptive properties of the model. It may be suggested that this attribute calls for a finer discrimination than leaders are able to exhibit and hence, should be eliminated from the model.

In addition to examining the main effects for the problem attributes the data from the Sets permitted the examination of the unconfounded interactions. For 32 of the subjects the interactive use of the problem attributes explained a significant proportion of the variance in his/her

selection of decision styles. The average number of significant interactions ($p < .01$) was approximately five with most of them being two or three way interactions. However, six of the subjects' significant interactions accounted for over 25 percent of the variance in their decisions. For a majority of subjects, and especially for about 10 percent, insight into the strategies in choosing decision styles is enhanced by knowledge of the interactive use of the problem attributes. Studies which attempt to gain insight into these interactions would be informative.

Another interesting finding concerning interactions was that in most cases the significant interactions for each subject were comprised of the same problem attributes that were significant for main effects. This suggests that a majority of the decision-makers utilized only three or four of the problem attributes when making their decisions while ignoring the rest. Vroom and Yetton (1973) have utilized both the recall method and the case study to assess the leadership style of their subjects in terms of their model. Hill and Schmitt (1977) offered an alternative method in the form of the Problem Attribute Sets. This study employed the latter two methods and found that they were similar in many ways. The correlation between the Vroom-Yetton similarity measures computed from the Cases and Sets were high for AFS, DMLP, and DVAR. In addition, the correlation between MLP for the subjects and the model's prescribed LMC were generally similar for both assessment instruments.

However, there were some notable differences between these measures. Possibly the most important difference was the variability in the employment of decision styles from these two methods. The VAR computed from the Cases and the Sets correlated $-.38$ and the proportion of variance attributed to individual differences in the leader was much higher in the Cases than in the Sets. These differences may be due to the greater complexity of the stimulus used in the Sets. The subjects may be relying on fewer decision styles in order to reduce the complexity of the task. It may be the case that when responding to the Sets, subjects tend to select a few decision styles that they are most comfortable with and then apply their concentration to the presentations of the problem attributes. On the other hand, when subjects respond to the Cases the more familiar narrative format demands less concentration, so subjects concentrated more on the different decision styles. Additional research is needed to resolve this issue.

Use of the Sets is advantageous for two reasons. By presenting a table of problem attributes to subjects instead of case studies, any error due to subjects' misinterpreting the presence or absence of the attribute in a given case is eliminated. A second advantage is that the procedure used in the present study is much simpler and less time consuming for subjects to complete. Hence, more situations can be presented allowing completely crossed designs and the assessment of subject reliability as in the

present study. Though subject reliabilities in the present study were less than might be desired, the generally positive results with respect to coincidence with Vroom-Yetton case method indicate that there is meaningful true variance in subjects' responses as well. Future research should direct some attention to increasing the reliability of subjects' responses.

The normative assumptions of the Vroom-Yetton model infer that leaders who closely resemble the model will be more effective than leaders whose leadership style is discrepant from the model. One of the major goals of the present study was to empirically test this assumption by undertaking a criterion-related validity study. However, before this could be done, a procedure for classifying leaders in terms of the model had to be established. Vroom and his associates have used many different measurements to describe leader behavior but have not presented a system for classifying leaders in terms of the model. This is a difficult task because no one measure seems to be able to represent the total complexity of the model. Therefore, it was decided that a composite of four variables would be used, these were AFS, ALMC, DVAR, and DMLP as defined earlier. Since both the independent variables and the dependent variables were actually a battery of measures, canonical correlation analysis was used. However, the normative assumptions of the Vroom-Yetton model were not strongly supported. The results demonstrated a marginally

significant relation between the Vroom-Yetton similarity indexes and the effectiveness criteria.

It appears that the Vroom-Yetton similarity index most closely related to the effectiveness variables is AFS. If this measure is a meaningful index of correspondence between the leader's behavior and the model then it may be concluded that leaders whose decision style approximates the model are superior in the technical aspects of their jobs, but are not perceived as more competent in the human relation aspects of their jobs. On the other hand, leaders whose decision style approximates the model as measured by a composite of ALMC, DMLP and DVAR appear to be superior in terms of human relation tasks but not technical skills.

These relationships become clearer when the basic nature of the indices are examined. ALMC, DVAR, and DMLP are all based on the model using the LMC. AFS is based on the model without reference to the LMC. While both measures are based on the ten rules, it appears that the introduction of the LMC has substantial effect on the normative properties of the model. Leaders who are similar to the Vroom-Yetton model, based on the LMC, are superior on one set of criterion measures and leaders who are similar to the model, without the LMC, are superior on other criterion measures. To further confuse the issue, the Vroom-Yetton model with the LMC prescribes the most autocratic decision style that is in the feasible set, however, leaders who are similar to this model tended to be higher in human relation skills

and not on technical skills. Conversely, leaders who are similar to the model without the LMC, thereby being more participative, were associated with high technical skills but not high human relation skills. From a conceptual stand point it would seem reasonable to predict results opposite to those reported in this study. However, these results suggest that perception of leader competence in terms of human relation skills and technical skills is not dependent singularly on level of participation, but rather is determined by a more complex set of criteria. The exact nature of this criteria is not clear from the results of this study.

The Vroom-Yetton model provides an extraordinarily useful structure to understand the construct of leadership. Past research has successfully supported both the contingency and basic descriptive assumptions of the model. However, the normative aspects are still unsupported. Future research effort needs to be directed at the utility of the LMC and establishing more sophisticated measurement systems.

In summary, the present study yielded substantial evidence to support both the contingency and descriptive properties of the model. In particular, it appears that leaders do vary their leader decision style using a criterion set that is keyed to situational characteristics. Further, it appears that this process is approximated by the model's rules and problem attributes. However, only

marginal relations were found between similarity to the model and leader effectiveness and the exact nature of these relationships is unclear.

STUDY II

Objectives and Hypotheses

The descriptive property of the Vroom-Yetton model contends that the model is representative of managerial behavior in common industrial situations. However, it has been noted that no research has been attempted to demonstrate if the model is equally valid for the different decision roles a manager fulfills (Mintzberg, 1973). An examination of Vroom's 48 case sets reveal that about 70 percent portray the leader in the resource allocator role. Since most researchers have used those 48 cases, or similar ones, there is some doubt as to whether the model's descriptive properties apply equally to other decision roles.

The objective of this study is to examine the resource allocator and disturbance handler decision roles and determine if the Vroom-Yetton model is equally applicable to them and to examine the effect of decision role on the level of participative decision-making. The following are the hypotheses for this study.

1. Leaders in the resource allocation decision role will conform more closely to the Vroom-Yetton model than when they are in the disturbance handler role.

2. Leaders in the resource allocator decision role will be more participative than when they are in the disturbance handler decision role.
3. Leaders will be more participative in situations where the Vroom-Yetton model calls for greater participation.

METHODOLOGY

Subjects

Subjects participating in the study were 13 state government law and accounting professionals who also had supervisory responsibilities.

Description of the Measure

Data for this study consist of the subjects' responses to a Vroom-Yetton style problem set. The problem set consists of 20 short case studies that were written for this study. The cases were patterned after the ones used by Vroom and his associates which are described in Study I of this thesis. These cases differ from the ones previously used in that they were written to conform to two of Mintzberg's management decision roles. Hence, 10 of the cases describe a manager in the resource allocator role and 10 cases describe a manager in a disturbance handler role.

In terms of the Vroom-Yetton classification individual and group problems were used. It was also decided that the cases would be constructed in a manner that would require each of four managerial decision styles defined by the least manhour criteria an equal number of times. Ten

problem attribute structures were selected in advance of the constructing of the cases and the cases were written to conform to these criteria. The same problem attribute structure was used in each of the two decision role classifications, thereby yielding 20 cases. The problem attribute structures are presented in Table 18.

In order to validate the problem attribute structure and the decision roles classification the procedure developed by Vroom and Yetton (1973, pp. 97-101) was adopted. This procedure dictates that ten expert judges, here defined as graduate students that have been trained in the relevant classification systems, read each case, decide if each of the problem attributes are present or absent, and determine what the manager's decision role should be. The criterion of 75 percent agreement on each judgment was used as the level of acceptance for a case. When this level was not achieved the case was rewritten and submitted to a new panel of five experts. All cases met the criterion following the second writing.

Description of the Data Gathering

The same procedures used to collect the data in Study I were employed in this study.

Table 18.--Problem Attribute Structure for the Problem Set.

Problem Type	Problem Attributes								
	A	B	C	D	E	F	G	H	LMC
1	+	+	+	+	+	+	0	+	1
2	+	+	+	0	+	0	0	+	1
3	+	0	+	+	+	0	0	+	2
4	+	0	+	0	+	+	0	0	2
5	+	+	+	+	0	0	0	+	3
6	+	0	+	+	0	0	0	0	3
7	+	0	+	+	0	+	0	0	4
8	+	+	+	+	0	+	0	0	4
9	+	0	+	0	+	+	0	+	5
10	+	0	+	+	0	+	0	+	5

+ = presence of problem attribute

0 = absence of problem attribute

Each of the problem types were presented in both management roles for a total of 20 cases.

ANALYSIS OF DATA

Two sets of analyses were performed on the data from Study II. The first set of analyses was intended to assess the similarity between subject responses on this new 20-case set and the Vroom-Yetton model. Therefore, the correlation between subjects' responses and LMC, MLP, subject variance, agreement with feasible set, and agreement with LMC were computed. The percentage of variance attributed to both individual subject differences and situational differences were found by performing a subject by situation (13 X 20) analysis of variance and computing omega squared (ω^2).

In order to investigate the influence of leader role on decision-making, the cases were divided into those in which the decision maker was in a resource allocating role and those in which the decision maker was in a disturbance handler role. The percentage of usage for each management decision style was tabulated. The possible influence of the two leader roles on the parallelism between subject response and the Vroom-Yetton model was assessed by assigning each subject a one if he/she agreed with the LMC and a zero if he/she did not and computing a

χ^2 on this agreement with LMC scores. Finally, the effect of leader role on level of participation was investigated by the use of a leader role by situational types by subjects (10 x 2 x 13) mixed model analysis of variance, employing the level of participation as the dependent measure.

RESULTS AND DISCUSSION

The correlation between the subjects' responses to the 20 cases and the Vroom-Yetton LMC ranged from .07 to .58, with a median of .34. The mean level of participation was 3.79, which is remarkably similar to that defined by the LMC, of 3.80. However, the subjects' average variance of 3.382 was noticeably lower than the 5.696 prescribed by the model. The agreement with feasible set for all subjects was 65.4 percent and the agreement with the LMC was 27.7 percent. Both of these indices are well above the chance levels of .40 and 14.3 percent, respectfully.

From these descriptive data analyses, it can be concluded that subjects perceived the new 20-case set in the same manner as the Vroom-Yetton case studies. There does appear to be substantial agreement with the Vroom-Yetton model, although the similarity between the responses of this sample and the prescribed responses appears to be somewhat less than in Vroom's samples (Vroom & Yetton, 1973; and Vroom & Jago, 1974). This may be attributed to decreased reliability in the shorter case set or, it may be an inherent characteristic of the sample itself.

Typically, Vroom has found that there is three times more systematic variance attributed to the differences in situations than to individual differences in the leaders. The subjects' responses were submitted to a subjects by situation fixed effects analysis of variance, which conforms to the analysis used by Vroom and his colleagues. Presented in Table 19 are the results of this analysis. Both factors were discovered to be significant with individual differences in subjects accounting for 4.8 percent of the variance and situations accounting for 47.6 percent. Consequently, in this study the situational differences account for about ten times as much variance as individual subject differences. Once again, this may be traceable to qualities of this sample or properties of this case set. Unlike Vroom's cases, or the problem sets of Hill and Schmitt (1977), where the LMC prescribed the AI management decision style much more often than others, each of four decision styles were appropriate an equal number of times according to the Vroom-Yetton prescription in the 20 cases used in this study. Since the cases themselves are more diverse and there is no reason to believe that these subjects differ in variability from other samples in the past, one may expect more variance attributable to the situation. Nonetheless, these results are supportive of past conclusions concerning the greater importance of situational properties in influencing leader decision-making.

Table 19.--Overall Analysis of Variance for Subjects and Situations for Study II.

Source	Ss	df	MS	F	P	ω^2
Subjects	43.1846	12	3.5987	2.0494	.021	.048
Situations	407.2462	19	21.4340	12.2066	.0005	.476
Error	400.3538	228	1.7559			

The major emphasis of this study was to examine the influence of leader decision role on congruency with the Vroom-Yetton model and level of subordinate participation in decision-making. Displayed in Table 20 are the percentages of usage for each decision style broken down by leader decision roles. From examination of this table it can be observed that when the subjects were in a disturbance handling role they varied their use of decision styles much less than when they were in a resource allocating role. This difference centers around the subjects' hesitance to use either an autocratic (AI and AII) or delegative (DI) decision style. This caused the subject in the disturbance handler role to make greater use of the middle of the participative scale.

Hypothesis 1 predicts that leaders in the resource allocation role will conform more closely to the Vroom-Yetton model than when they are in the disturbance handler role. To test this hypothesis the percentage of agreement with feasible set and least manhour criterion (LMC) were computed in both roles. Agreement with feasible set was 68.5 percent for the resource allocator role and 62.3 percent for the disturbance handler. Agreement with LMC was 35.4 percent in the resource allocator role and 20.0 percent in the disturbance handler role. Since agreement with feasible set and agreement with LMC are highly related measures, with agreement with LMC being more precise in terms of the Vroom-Yetton model, a χ^2 was computed only on

Table 20.--Percentages of Decision Style and Summary
Measures for Subjects and the Vroom-Yetton Model.

Process	Resources Allocator		Disturbance Handler		Overall	
	Subjects	Model	Subjects	Model	Subjects	Model
AI	14.6	20.0	10.0	20.0	12.3	20.0
AII	16.9	20.0	6.9	20.0	11.9	20.0
CI	23.1	20.0	29.9	20.0	25.9	20.0
CII	11.5	0	21.5	0	16.0	0
GI	10.8	0	18.5	0	14.2	0
GII	7.7	20.0	10.0	20.0	9.2	20.0
DI	15.4	20.0	6.2	20.0	10.8	20.0
MLP	3.72	3.80	3.86	3.80	3.79	3.80
VAR	4.24	5.96	2.53	5.96	3.38	5.70

agreement with LMC. The χ^2 was significant, $\chi^2 (1) = 6.58$, $p < .02$, demonstrating that the subjects do in fact conform more closely to the Vroom-Yetton model when they are in the resource allocator role rather than the disturbance handler role, hence, hypothesis 1 was supported.

Hypotheses 2 and 3 were tested by conducting a leader roles by decision types by subjects ($2 \times 10 \times 13$) mixed model analysis of variance with level of participation serving as the dependent measure. Table 21 contains the analysis of variance summary table and Table 22 contains the cell means and prescribed LMC for each cell. Hypothesis 2 predicted that resource allocators would be more participative than disturbance handlers. Table 21 indicates that the leader role factor was not significant, hence, hypothesis 2 is not supported. In cases where the LMC called for a less participative style (A or C) disturbance handlers were generally more participative, and in cases where the LMC style was delegative the leaders in the disturbance handler role were less participative. This observation is reinforced by the significant leader role by situation type interaction. It appears that in emergency or in non-routine situations (disturbance handling) the leaders in this sample were more reluctant to exclude their subordinate or themselves from the decision-making than when they were faced with the same combination of presence or absence of problem attributes in a resource allocator role. In addition, leaders in the disturbance handling

Table 21.--Analysis of Variance Table for a Leader Role x
Problem Type x Subjects.

Source	Ss	df	MS	F	P
Leader Role	.5538	1	.5538	.348	.566
Role x Subject (error)	19.0461	12	1.5872		
Problem Type	267.3077	9	29.7008	16.721	< .005
Type x Subjects (error)	193.8923	108	1.7953		
Role x Type	121.1385	108	13.4598	6.722	< .005
Role x Type x Subjects (error)	216.2615	118	2.0024		

Table 22.--Cell Mean for Level of Participation and the Prescribed LMC by Problem Type and Leader Role.

Problem Type	Resource Allocator	Disturbance Handler	Vroom-Yetton LMC
1	1.923	3.769	1
2	2.462	2.923	1
3	2.385	2.615	2
4	2.692	4.923	2
5	2.385	2.615	3
6	3.462	4.308	5
7	5.462	4.231	6
8	3.462	4.308	6
9	5.000	4.154	7
10	6.385	5.231	7

role seldom agreed with the LMC in cases where an autocratic style was prescribed. This could be due to the subjects' perceived need to maintain greater than normal subordinate commitment to decision-making in non-routine situations.

Hypothesis 3 predicted that overall subjects would vary their level of participation in congruence with the Vroom-Yetton LMC. This hypothesis was confirmed by the significant problem type factor in the analysis of variance. Inspection of the cell means in Table 22 demonstrates that in general, leaders were more participative in situations where the LMC prescribed greater participation, particularly in the resource allocator role.

SUMMARY AND CONCLUSIONS

The results of this study are generally supportive of the Vroom-Yetton model in that a set of new cases administered to a somewhat different managerial sample produced similar results. The agreement with feasible set, LMC, and the correlation with LMC, were greater than chance, although they were somewhat lower than in past studies. This may be traceable to the reduced reliability of the assessment instrument due to the use of fewer cases and the inclusion of disturbance handling cases. The ten to one ratio between variance accounted for by the situation and individual subject difference corroborates Vroom's (Vroom & Jago, 1974; and Vroom & Yetton, 1973) and Hill and Schmitt's (1977) findings in that the situation in which a leadership decision must be made is a major contribution in the choice of management decision style. This study's finding that the situation accounts for about ten times more variance than individual differences is somewhat greater than the four to one ratio found in other studies. This difference may have been caused by the diverse problem attribute structures of the cases which were compiled to produce

equal usage of the management decision styles as prescribed by the LMC. All in all, the situation by subjects analysis was supportive of past conclusions.

It was also discovered that two of the managerial decision roles defined by Mintzberg (1973) have an effect on both the level of participation afforded to subordinates and some of the descriptive properties of the Vroom-Yetton model. When the subjects responded to cases in the disturbance handler decision role they were disinclined to either make the decision all by themselves, by using AI or AII, or delegate the problem to their subordinates. This response pattern had the effect of reducing the variability of the responses in the disturbance handler role, and lowering the agreement with LMC when it demanded AI, AII, or DI. These results may be due to the leader redefining the criterion which he/she uses to answer yes or no to key problem attributes in disturbance handling cases. For example, in disturbance handling roles, a leader may perceive that there is greater risk in making a decision. He/she, therefore, tends to share the problem with his/her subordinate in order to share the risk. In this case, it may be a common leader decision strategy to attempt to obtain a higher level of subordinate acceptance in order to lessen the risk of failure. This redefining of the criteria would cause the lack of agreement with the LMC which was found for these cases in the present study. Additional research is needed to determine if these findings are

important enough to justify the inclusion of decision roles as a new problem attribute.

In summary, the 20 case set used in the study yielded results that were in substantial agreement with data collected by Vroom and his colleagues. The analyses indicate that subjects were responding to the different cases in a manner that conforms to the Vroom-Yetton model. However, it was also found that leaders in a disturbance handler role tend to deviate from the model in that they are more reluctant to use an autocratic or a delegative style than when in a resource-allocating role.

APPENDIX

APPENDIX

MANAGERIAL PERFORMANCE SCALE

On the next five pages are 21 important dimensions of a manager's job. Under each dimension title are three descriptions of differing levels of performance labeled A, B and C. On the separate rating form, please indicate which of the descriptions most accurately describes that person. If you feel that the best description of a supervisor is between descriptions A and B or B and C, you mark in the space between the letters on the rating form.

For example, if on the first dimension you feel that this person's performance is somewhere between description A and description B, then you would mark the rating form as follows:

1. Supervisory skills

	X			
A		B		C

On the other hand, if on the second dimension you feel that C is the best you would mark as follows:

2. Use of information

				X
A		B		C

You have been provided with a separate rating form for each person you are to rate. Please read all descriptions within each dimension carefully before you start your rating. Then rate all 21 dimensions, for each person, as independently as you can. In most cases, a person is strong in some areas while weak in others. Try not to let your judgment on one dimension affect your judgment on another.

Since this performance scale is commonly used for men and women, both male and female pronouns have been used for the items. It should be understood that the items apply to all persons.

Thank you for your cooperation.

1. Supervisory Skills

- A. He/she is a skillful supervisor and he gets his/her subordinates to work efficiently and according to direction. He/she is a born leader.
- B. He/she does well as a supervisor and gets the work going smoothly. He/she is not exactly a great leader, but he/she is as good as most of the others who have managerial positions.
- C. He/she is probably better suited to a subordinate rather than a superior position. Under his/her direction the work does not proceed quite as efficiently and without friction.

2. Use of Information

- A. He is always able to use the information given him to do his job. He understands the necessary data and other information that is presented in their various forms. He will request more information when he feels it will help him to do a better job.
- B. He understands most of the information provided him, but is sometimes unsure of how to apply it. He tends to focus on some types of information while ignoring others. He does not usually request more or new information.
- C. He finds it most difficult to use the information provided to him. He would rather use his past experience supplemented with only limited new information. He often requests less information.

3. Initiative

- A. He is a real self-starter. He always takes the initiative and his supervisor never has to stimulate him.
- B. While generally he shows initiative, occasionally his superior has to prod him to get his work done.
- C. He has a bit of tendency to sit around and wait for directions.

4. Innovation

- A. While she fully appreciates the value of proven ways of dealing with problems, she does have many new ideas and her thinking is not restricted.
- B. While she does have some ideas, she is usually content with the customary and familiar solutions.
- C. She rarely has original ideas, and almost always has to deal with problems in the customary routine fashion.

5. Assertiveness

- A. He is a conspicuous leader within his department. He always directs the attention of his subordinates to the need for productivity and cost effectiveness. He feels comfortable in confronting and discussing these types of problems with his subordinates.
- B. His leadership abilities allow him to be in command of his department. However, he sometimes fails to focus on productivity and at times lets minor problems pass without effective action or discussion with his subordinates.
- C. While he is an able leader, he is not noticeably in command of his department. He finds it difficult to confront his subordinates on productivity issues and is usually unwilling to pursue such matters.

6. Knowledge of Subordinate Jobs

- A. Her vast expertise in the technical areas under her supervision provides her with the ability to manage with ease. She also has the knowledge to deal with routine problems quickly and efficiently.
- B. While she has considerable knowledge of the technical areas, there are noticable gaps. She sometimes must obtain help from others to deal with problems.
- C. Technical expertise is not the strong point of this supervisor. She does not have a great deal of knowledge on some of the areas under her control and therefore must rely on her other leadership abilities to get the job done.

7. Motivation

- A. A real workhorse. She works much harder than her job really requires.
- B. She is sufficiently industrious and earnest in her work. You cannot accuse her of being lazy; nevertheless, you wouldn't say she is exceptionally diligent.
- C. She has a touch of laziness. She does just what is required to do, but no more.

8. Enthusiasm

- A. He is most enthusiastic about his job, and is completely engrossed in his work.
- B. He is indeed interested in his job. Nevertheless, one would not say that he is among those few who are among the highest level of eagerness.
- C. While by no means does he dislike his job, he is more or less indifferent to it. Even though he finds much of the work interesting, it cannot be said that he has a real zeal for it.

9. Participation

- A. He is willing to allow his subordinates opportunity to participate in decision making when it is appropriate. He listens to their suggestions and implements them or tries to influence his superiors to accept them when they are constructive.
- B. He is willing to allow his subordinates opportunity to participate in a limited sense. While he listens to their suggestions, he often does not follow through with them.
- C. He is not really concerned with participative decision making. While he respects most of his subordinates, he feels it is his job to manage the work in his department.

10. Planning

- A. It is characteristic of her that she thoroughly and completely plans her activities, and clearly sees that which is to be achieved. Her plans are always worked out logically and systematically.
- B. While she does plan her work before she starts it, nevertheless sometimes the parts are not well organized. Ordinarily she is fully aware of the objectives toward which her work is directed.
- C. Usually she begins a task without first completely planning her activities. She does not organize the various phases of her job quite as well as she might, nor does she fully appreciate its objectives.

11. Composure

- A. She is a very calm person, never losing her head or becoming at all nervous.
- B. She is usually calm but in difficult situations she may become a little nervous. However, this does not have much, if any, effect upon her behavior.
- C. Her nervousness is apparent when a situation becomes difficult. She cannot always control herself.

12. Permissive

- A. He is a fair but disciplined supervisor. He is never hesitant to point out counter productive activities and behavior and deal with a problem subordinate in a constructive manner. If necessary, he can be expected to initiate the proper disciplinary action.
- B. He is able to maintain control of his department by acting on major problem employees. He often chooses to ignore minor problems or waits until minor problems become more disruptive before he takes action. He sometimes needs help from his superiors to handle people related problems.
- C. He is a somewhat permissive supervisor. He finds it difficult to confront a subordinate when he/she exhibits non-productive behavior. He relies heavily on his supervisor to handle people problems within his department.

13. Report Making

- A. Both his written and oral reports are well formulated, thorough, and well thought out. They rarely need additional explanation.
- B. His reports are useful and meaningful, but they usually require some additional explanations.
- C. Sometimes his reports are so incomplete and poorly organized that they are of little value, or must be done over.

14. Self-Confidence

- A. Behaves confidently. Reacts in all situations without hesitation and with assurance.
- B. Has normal self-confidence, with only occasional uncertainty. She is usually open and assured.
- C. She is a little shy and uncertain. Occasionally avoids situations which require her to take a position.

15. Delegation of Authority

- A. He always has complete and unwavering confidence in his subordinates, and he never fails to delegate to them the full responsibility they need to do their jobs, and all of the power to make the decisions they must.
- B. He does have faith in his subordinates, and he does delegate authority to them. However, with very important matters he keeps the final decision to himself. But in minor matters he invariably gives the responsibility to his subordinates.
- C. While he does have confidence in his subordinates, it is limited. On some occasions he keeps to himself decisions on matters which others delegate to subordinates.

16. Attitude Toward Superiors

- A. His superior finds him very easy to get along with, and in turn, he is positively oriented toward his superior.
- B. In general his superior can get along quite well with him, and by and large he regards his superior favorably.
- C. As a subordinate he is sometimes a little difficult to handle. His attitude toward his superior sometimes leaves something to be desired.

17. Carefulness

- A. Her work is striking in its accuracy. There is never any evidence of carelessness in it.
- B. The accuracy of her work is satisfactory. It is not often that you find clear evidence of carelessness.
- C. Her work is spotty, sometimes being all right and sometimes not. She could be more accurate and careful.

18. Efficiency

- A. She is quick and efficient, able to keep her work on schedule. She really gets going on a new task.
- B. She is efficient enough, usually getting through her assignments and work in reasonable time.
- C. There is some lack of efficiency on her part. She may take too much time to complete her assignments, and sometimes she does not really finish them.

19. Relations with Other People

- A. He is on good terms with everyone. He can get along with people even when he doesn't agree with them.
- B. Gets along with most people. Only very occasionally does he have conflicts with others on the job, and these are likely to be minor.
- C. He has a tendency to get into unnecessary conflicts with other people.

20. Participation in Meetings

- A. She contributes in many ways in any meeting. Because of the active part she plays in the discussion, she has a very real influence on the outcome and on the decisions reached.
- B. She plays an active part in most meetings and sometimes her influence is seen in the outcomes of the discussion.
- C. She participates very little in meetings as a consequence, she does not have much influence upon the outcomes or decision.

21. Competence

- A. He is very useful--almost irreplaceable--in his present job. It would be very difficult to find another man like him to fill that position.
- B. He is useful in his present job, but not irreplaceable. It is well worth keeping him in the company, even though he could be replaced with new, equally good persons.
- C. You could rather easily find another at least equally good man to take his place. It would not be a great loss if he should leave the company.

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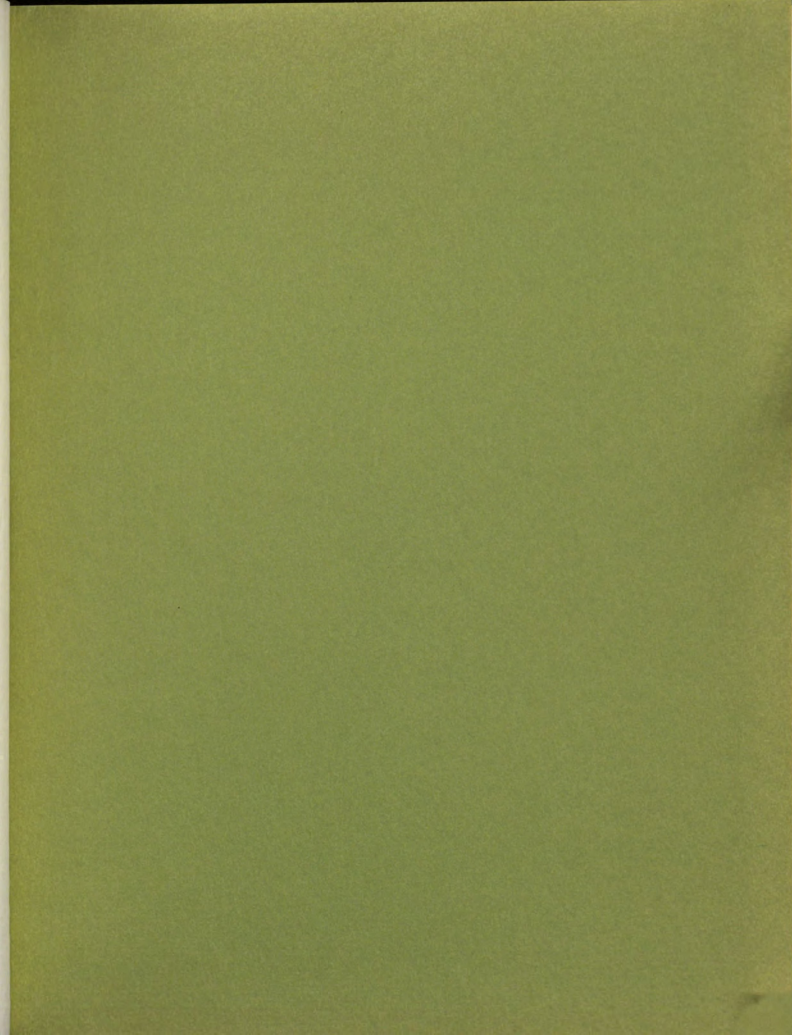
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