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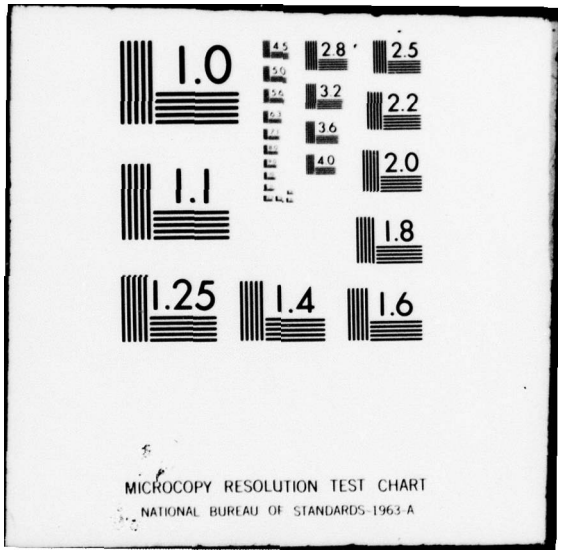
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POLICY-CAPTURING AND WORK MOTIVATION: NEED FOR ACHIEVEMENT, AFFILIATION, AND POWER

THESIS

AFIT/GSM/SM/78S-22 Billy G. Thomas
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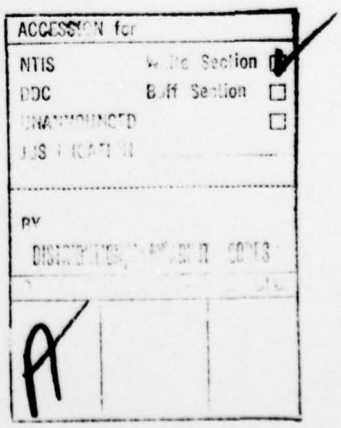
PREFACE

Among the challenges facing Air Force Managers is the ability to understand the motivations of themselves as well as the motivations of those managed. Facing this challenge is critical to the building of organizational effectiveness and providing individuals with desirable, satisfying work environments. I hope that this research provides the seed for the development of a better tool than many managers now have available to them for understanding and predicting the behaviors of those managed.

Sincere appreciation is expressed to those individuals in the Air Force Avionics Laboratory, Air Force Institute of Technology and Air Force Chaplain's School who, possibly laboriously, completed the surveys. Special acknowledgement is given to Lieutenant Colonel Adrian M. Harrel, my faculty advisor, and Captain Michael J. Stahl, my reader, who developed the decision-making instrument and suggested the research topic.

But especially, I express appreciation to my wife, Denise, whose hard work made this final report possible.

Captain Billy G. Thomas, Jr.



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ABSTRACT

The policy-capturing technique was used to measure the strength of individuals' needs for achievement, affiliation, and power. The cues used in the exercise were based upon the descriptions of the three needs presented by McClelland. The population sample consisted of over 395 personnel assigned primarily to five vocations - engineers and scientists, managers, staff persons, professors and chaplains. The organizations sampled were the Air Force Avionics Laboratory, WPAFB, OH, Air Force Institute of Technology, WPAFB, OH, and Air Force Chaplain's School, Maxwell AFB, AL. Analyses were performed using the standardized beta weights and relative weights derived from the linear multiple regression technique employed in the policy-capturing methodology. Additional analyses consisted of descriptive techniques, multivariate analysis of variance, and t-tests to examine the vocational profiles of the weights and the relationship of the weights to performance and job satisfaction. The results of the research indicated that policy-capturing appeared useful as a motivational measurement technique. However, few motive-behavior relationships predicted from McClelland's research into the needs held true for this study. Organizational or individual factors appeared to strongly attenuate any monotonic relationship between need strength and behavior that may have existed.

POLICY-CAPTURING AND WORK MOTIVATION: NEED FOR ACHIEVEMENT, POWER AND AFFILIATION

I. Introduction

"Motivation concerns the conditions responsible for variations in the intensity, quality, and direction of ongoing behavior (Landy, 1976:295)."

Introduction

Those individual behaviors that are crucial in determining the effectiveness of organizations are, almost without exception, voluntary, motivated behaviors. According to Lawler (1973, Ch 1), to explain and predict these behaviors a theory of work motivation must be more than just an acceptable theory of human needs. Such theories deal only with why some work outcomes - such as pay, promotion, challenge, or influence - are important to an individual's need satisfaction while others are not. To understand needs conveys little, if any, understanding of how needs are translated into energy expenditure or behavior. While work roles (Miller, 1977) and job characteristics (Daspit, 1978) influence behavior, these factors, as well as the total of the work ecosystem, appear to do so only within the context of the affective responses they arouse with respect to an individual's need structure. The intensity, quality, and direction of individual behavior, therefore, appears to result from a cognitive choice among alternative forms of activity implied by these reactive responses.

Work Outcomes

In the most general sense, needs refer to clusters of outcomes that people seek as ends in themselves. Why people have needs and the origins of needs, however, is not critical to this research effort. According to David C. McClelland of Harvard University (1951), individuals have learned from childhood to associate various affective psychological states with informational cues about the outcomes resulting from particular kinds of activity. Work outcomes, therefore, take on value through the arousal and reactivation of these affective states by the informational cues present in various work activities. Simply put, work outcomes are valued because they satisfy needs or lead to outcomes that do (Lawler, 1973: 30).

The structure of most jobs - which includes technological features, supervisory-employee relationships, organizational policies and informal relationships - strongly affects the kinds of outcomes that are potentially available to the individual worker as well as the behaviors that may be engaged to achieve those outcomes. The types of outcomes provided by the organization are numerous. The most obvious ones are pay, promotion, and fringe benefits. Some authors have identified "core dimensions" of work - variety, autonomy, task identity, feedback, coordination, and friendship opportunities - essential to job enrichment (Sims and Szilagyi, 1976). Relating these outcomes to the affective states they arouse, extrinsic outcomes such as pay, promotion, or fringe benefits bear no inherent relationship to work activity itself. Instead they are "artificially selected

to influence the behavior" but are not a natural consequence of it (Gailbraith and Cummings, 1967: 242-243). On the other hand, outcomes such as autonomy, variety, and feedback are valued because they are inherent characteristics of the work activity. Much research and many organizational practices have historically taken normative approaches to work outcomes without considering the underlying individual differences in outcome valence. Such approaches may well explain the "dysfunctional behaviors" (Lawler, 1973: Ch 6) and "mixed responses" to job enrichment (O'Reilly, 1977) found in organizations. An understanding of needs and the relationship to outcomes capable of satisfying these needs would appear to be necessary, though not sufficient, for a "parsimonious study of motivation" (Zedeck, 1977: 48).

Need for Achievement, Power, and Affiliation. For over twenty-five years McClelland has been investigating the affective responses individuals have toward their work, the typical behaviors associated with these responses, and the conditions under which the affective states are aroused. He has attemped to get past the insensitivity of self reports as behavioral indicators to find out what is going on inside the head of an individual when an affective response has been aroused (McClelland, 1975: 6). As a result, he and his associates have categorized three patterns of motivation which seem to permeate an individual's "style of life" and intrinsic approach to work. The motives are need for achievement (n ach), need for power (n pow) and need for affiliation (n aff) (Chapter II). High n ach individuals seek challenging, but feasible, goals and immediate,

detailed performance feedback. "Achievers" enjoy doing things themselves and their striving for better ways of doing things is strongly related to socioeconomic success. High n pow is seen as an essential motive where influencing the behavior of others is involved and is critical to effective management of organizations. Need for affiliation involves the desire to establish and maintain friendly relationships with others. One might notice the similarities between the work outcomes associated with these motives and the intrinsic work outcomes mentioned previously as important in work organizations.

Modeling Motivation and Behavior

There are two aspects of McClelland's theory, like most "need" theories, that limit rigorous use of the theory to explain specific individual behaviors in specific organizational settings. The first is based upon the fact that operationalizing the theory requires some measure of motive strength. Traditionally, fantasy based measures, in which subjects project their motives by writing stories to Thematic Apperception Test cards (TAT), have been used. Raters then score the stories for thematic motive content. However, tests of the TAT in n ach situations have generally been only 30% to 40% reliable in explaining variance among subjects (Entwisle, 1972). This problem would only be compounded if scoring was performed by other than trained professional psychologists.

The second aspect is that the link among outcome valence, energy expenditure, performance, and attitudes is not explicit in the theory (Landy, 1976: 300-311). For example, under what conditions might an "achiever" seek power related outcomes? On

the one hand the motivation question for an individual is, "How is one's behavior instrumental in obtaining valued outcomes?" For the organization the question is, "How do the outcomes that the organization can or is willing to provide lead to desired job performance and job attitudes?" The answer to these questions is not based on absolute assessments of an individual's achievement, power, or any other type of need. Nor is the answer based on an across-subjects assessment of a particular need strength. Rather the answer is based on the strength of an individual's "A" need relative to "B" and "C" needs (Zedeck, 1977). The prepotency among an individual's needs interacts with the bounded set of outcomes available to the individual and the bounded set of organizationally allowable activity to infer alternative forms of behavior to the individual. Insight into the within-individual mental choice process among these alternative behaviors is, therefore, conjoint with an understanding of needs if behavior is to be fully modeled (Parker and Dyer, 1976: 68).

Cognitive Models. If one assumes that human action is predicated by the mental processing of informational cues related to the activity then the psychological research into human judgmental processes would appear useful in modeling behavior. Zedeck (1977: 47-54) supports this view and iterates three potential benefits of an information processing approach to motivational studies. First, judgmental modeling capitalizes upon alternatives in the choice process. Second, judgmental modeling focuses upon the process as well as the

relative importance of factors affecting choice. And third, many variables and interrelationships among variables can be accommodated in the process.

Limited Rationality. Implicit in the concept of modeling behavioral choice is the assumption of "rational man". Clearly an individual whose behavior is dominated by defense mechanisms, emotions, and grossly distorted perceptions would not fit well into any cognitive model of behavior (Turney, 1974: 69). However, there seem to be other factors that may limit the "rational" behavior of individuals as viewed by others. Translation of motivation into behavior is constrained by realization of opportunities to act, external predictors of performance (such as technological and productivity constraints),and individual differences in capability and aptitude (Parker, 1976). Another factor is the tendency of individuals to satisfice with respect to energy expenditure rather than to maximize with respect to outcomes (Graen, 1969; Wahba and House, 1974). And finally, there is the inability of individuals to make reliable subjective self reports about factors influencing their behavior (Slovic and Lichtenstein, 1971).

Policy-Capturing. A judgmental modeling paradigm generally refered to as policy-capturing (Ch III) seems well suited to addressing the behavior modeling issues discussed thus far. Policy-capturing could overcome many of the problems encountered in operationalizing a need theory such as McClelland's in specific job situations - objectivity and consistency of need measurement,choice among alternatives, and within persons analysis. The focus would

not be on a subject's subjective statements of outcome importance or vague, normative descriptions of outcome-behavior relationships. The focus instead would be upon actual behavioral intention wherein the relationships among factors are infered and made mathematically explicit. Policy-capturing would provide statistical measures of the consistency or "rationality" with which an individual used motivational cues to choose among alternative behaviors. The paradigm would also readily accommodate across-subjects analyses often desired in organizational settings. However, analyses could be performed based upon homogeneity of individual motivational patterns rather than by more arbitrary means.

Scope and Research Objectives

Despite these accolades, policy-capturing has not been extensively applied to need importance - work motivation scenario. The scope of this research, therefore, is upon investigating the feasibility of applying policy-capturing models of motivation in actual work environments. The objectives of this research are -

(1) to measure the importance through policy-capturing, that individuals in diverse Air Force populations place upon needs for achievement, power, and affiliation,

(2) to determine the degree to which self-reports of need importance coincide with policy-captured measures,

(3) to determine the degree to which the need configurations of various vocational groupings of individuals correspond with those predicted from research into the three needs, and

(4) to determine the degree to which the need measures can be used to predict performance and job satisfaction.

Assumptions and Limitations

The use of policy-capturing is well founded in the literature as it pertains to task oriented behavioral choice. However, as Zedeck (1977) points out the full implications of such an approach in motivation research are not fully known at this time. The methodological and statistical assumptions that underlie policy-capturing are iterated in Chapter III. Inherent to this research is the assumption that the concepts of need for achievement, power, and affiliation have some affective meaning to the individuals sampled. The assumption that the informational descriptors of these motives used in the policy-capturing exercise are adequate to arouse the essence of the motives as theorized by McClelland and others is critical to this methodology. There are two primary limitations upon any conclusions made in this research. First, there is no way of verifying if those persons responding to the research instrument are representative of the populations from which they are sampled. And second, there are factors not treated explicity in this research - for example, extrinsic job outcomes, personality variables and structural variables - that have been shown to moderate the relationships between intrinsic outcome importance, job performance and job satisfaction.

II. Need For Achievement, Power, And Affiliation

Overview

In this chapter the concepts of achievement, power, and affilation are discussed. Throughout the discussion one must keep in mind the distinction between the motive to act and actual activity. While most of McClelland's descriptions of the motives are in terms of prescriptive activities, these prescriptions are only the result of general correlations found between these activities and thematic measures of the motives. Action obviously is constrained by the opportunity to act. But first and foremost, according to McClelland, for action to be effective the individual must possess the motive pattern most suited to the behavioral characteristics of the job. In the absense of a clearly defined "proper" motive pattern or reward contingency situation, individuals will act according to their own pattern of prepotent needs.

Among McClelland's objectives in his more than twenty-five years of research has been the desire to correct many "common sense ideas" about motivation. In general, persons should not be considered "unmotivated" if their behavior does not meet the expectations of others. Rather it would be safer to say that the persons were motivated by different things - some toward "A", some toward "B", and others toward "C". These motivations reach back into an individual's childhood and remain relatively stable over the individual's lifetime unless there are strong forces upon the individual to change them (McClelland, 1966: 149). Some

authors question the immutability of such orientations (O'Reilly, 1977) and argue that McClelland's motive-task correlations appear stronger than they really are because of the possible changes in a person's orientation to meet the current realities of one's job (Korman, et al., 1977: 179-183). McClelland contends, however, that significant short range changes in motivation occur only under the controlled, intensive regimen of development workshops. Such changes in motivation persist only if the characteristics of one's job or environment reinforce the new motives (McClelland, 1966: 150-153).

The current interest in motive development is a long step from the early interest of McClelland, Atkinson, and others in a reliable methodology for measuring various facets of personality. It was through the development of the Thematic Apperception Test (TAT) that these researchers "discovered" a "curious dichotomy" in the psychological makeup of some persons and not others described best as an urge to achieve (McClelland, 1966: 147; McClelland, et al., 1976).

Need for Achievement

McClelland gives this example of the "curious dichotomy" -

> Several years ago, a careful study was made of 450 workers who had been thrown out of work by a plant shutdown in Erie, Pennsylvania. Most of the unemployed workers stayed at home for a while and then checked back with the United States Employment Service to see if their old jobs or similar ones were available. But a small minority among them behaved differently. The day they were laid off, they started job-hunting....Obviously, the members of the inactive minority were differently motivated. All the men were in the same situation objectively: they needed work, money, food, shelter, job security. Yet only a minority showed initiative and enterprise in finding what they needed (McClelland, 1966: 147-148).

To McClelland the motive underlying the behaviors of these initiating and enterprising individuals also seemed to be an extremely important factor in the economic growth and stability of nations throughout history. These findings were based upon the thematic scoring of popular literature from various countries over periods of time. These achievement profiles consistently correlated with various indicators of economic growth (McClelland, 1961). In his attempt to find the specific human behavioral basis for the relationship of achievement and economic success he focused upon the motives and activities of entrepreneurs. In the research an entrepreneur was defined as anyone directly and personally involved with the formation, overall goals and purposes, and market success of a business enterprise. McClelland found that not only did entrepreneurs generally score high on thematic need for achievement but that variances in score were positively correlated with the success of the enterprise (McClelland, 1969).

Characteristics of an Achiever. Essentially the research indicates that when individuals think in terms of "doing things better" organizations thrive. The person high in n ach sees one's own effort as the locus of causality for any activity and, therefore, takes personal responsibility for finding solutions to problems of that activity. The achiever, however, needs concrete and immediate feedback concerning the success of one's efforts. This feedback is necessary because it is the feelings of achievement and successful accomplishment measured against an internalized standard of performance that are the important

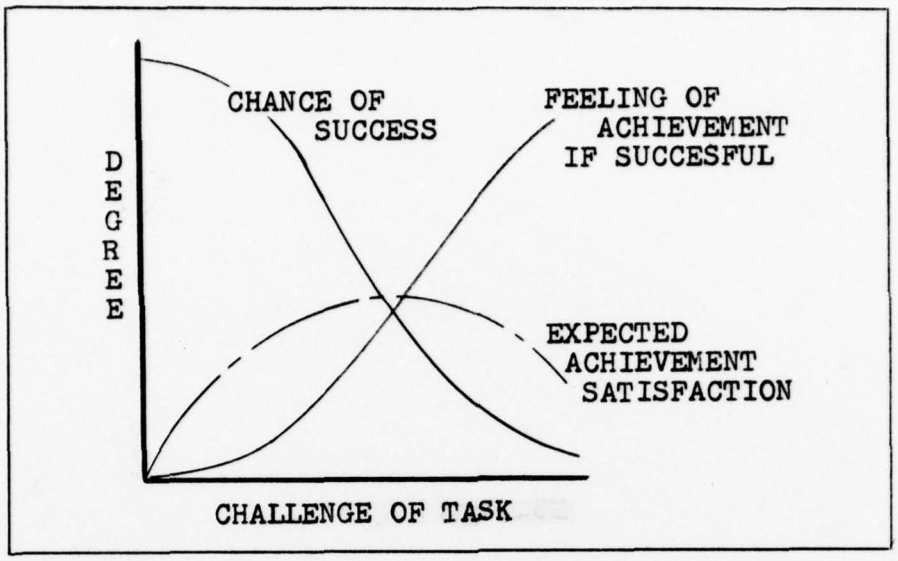

Figure 1. Relationship Between Task Challenge and Satisfaction for High N Ach, Source: McClelland, 1962

work outcomes to an achiever. The achiever prefers situations were success or failure is determined by the individual's moderate expenditure of effort rather than involving risk, chance, or a seemingly impossible or trivial challenge. An achiever is continually reevaluating the meaning of "moderate effort" in terms of past successes, current perceived capabilities, and future challenge. Figure 1 demonstrates why an achiever prefers moderately challenging tasks. Effort, which is essentially the inverse of the challenge of a task, is optimized for a <u>potential</u> task by an achiever when the expected feeling of satisfaction of performing the task is balanced by the dissatisfaction of failing the task. However, despite perceptions of optimal effort expenditure an achiever will expend the effort on a <u>given</u> task most in keeping with the

individual's internal standard of performance. While a person high in n ach may in fact accummulate wealth or possessions, the importance of these extrinsic work outcomes is not generally the rewards per se. Rather it is the perceptions of one's capabilities and past successes infered from the rewards that are important (McClelland, 1962: 103-105).

Universality of Achievement Motivation. McClelland's conclusions concerning entrepreneurship may be generalized to any job where striving is important. Among these are engineering, research and development, and consulting jobs. Atkinson and others whose research into achievement motivation started from the same seed as McClelland's have taken somewhat oblique courses to him This research has generally involved models of achievement behavior in specific situational scenario. Atkinson's model incorporates concepts such as expected value of performance, preferences among specific extrinsic outcomes, persistence, and efficiency of action not included in McClelland's description of the motive. Recently, Atkinson's model has been revised to incorporate present achievement behavior as contingent upon a series of events and opportunities extending into the future (deCharms and Muir, 1978: 92-93). The model, however, generally supports McClelland's formulation except for conclusions of strictly monotonic relationships between achievement and performance in all situations (Atkinson and Raynor, 1974: Part III). Other researchers have also found positive relationships between job performance and job satisfaction when performance was related to productivity or economic growth and when the job scope encouraged

achieving behavior (Steers, 1975; Johnson and Stinson, 1975; Steers and Spencer, 1977; Stone, 1977).

Dysfunctional Behaviors. Need for achievement is not without dysfunctional aspects. The "loner" aspects of a high achiever's behavior may cause difficulties if group processes are inherent in the work activity. Group goals may become subordinated to those of individuals (Steers, 1975: 398). The nature of some tasks may not warrant the level of striving perceived by the individual as critical to success in the task (Atkinson and Raynor, 1974: 300-310). Research is increasing into the stress-inducing aspects of achievement behavior and the so-called "male midlife crisis" (Korman, et al., 1977: 182).

Not all "great achievers" score high in need for achievement. In fact the president of one of the most successful achievement oriented firms studied by McClelland scored exactly zero in n ach (McClelland, 1975: 253). The implication is that there may be more to success in organizations than simply high need for achievement.

Need for Power

As research on achievement motivation has shifted from the individual to the organizational climate that encourages and rewards an individual for doing well, it has become obvious that individuals can seldom act in isolation. Regardless of how high an individual's achievement motive may be, one cannot excel if there are no opportunities to excel or if the organization does not provide rewards contingent upon performance. On the other hand, an individual low in n ach would not perform

regardless of the opportunities unless the motives that the individual did have were aroused and directed into constructive activities. An organization is made up of a diversity of motivations and personalities. As a result organizational contexts quickly become ones in which individuals are managed, controlled or directed by others. If an organization is to be effective, those who are responsible for orchestrating and influencing the behavior of others must first desire to be influential. This desire to be influential is refered to as the need for power (McClelland, 1975: 254).

McClelland and his associates have, during the past few years, turned their research specifically toward the power motive in organizational management. Almost by definition a good manager is one who creates a healthy organizational climate - helps subordinates feel strong, rewards them for good performance, fosters team spirit, and insures that the elements required to accomplish tasks are available and organized. In examining the motive scores of over 50 managers of both high and low morale units in one company, over 70% were high in power motivation as measured by the TAT. The better managers, as measured by the organizational climate within their units, tended to score even higher in n pow. In addition,McClelland found a positive relationship between supportive managerial style and n pow for the more effective managers (McClelland and Burnham, 1976). Yet in spite of the apparent importance of power to organizational effectiveness, power remains possibly the most complex, most shunned, and most misunderstood aspects of human behavior.

Two Faces of Power. There seems to be an almost obsessive suspicion of anyone who desires power. This is apparently a result, in large part, of the widespread perceptions of the negative manifestations of power - dominance-submission, competition, zero-sum game, and exploitation. In fact there is a constant paradox confronting anyone who desires to or who must play the influence game. Leadership is a well established concept in psychosocial theory. Yet for anyone faced with accepting the responsibilities of leadership there is the pervasive possibility of being accused of manipulating others. Granted, there are many examples of misuse of power. Undoubtedly however, a controlled,constructive, positive aspect of power exists in addition to the more commonly perceived negative face (McClelland, 1975: 252-257).

In fact, TAT measures of power motivation have identified dichotomous themes in high n pow stories written by individuals in diverse experimental situations. In one set of stories appeared the personal theme of man-to-man competiveness in which dominance or victory was the desired outcome. In another set appeared more socialized themes involving indirect, altruistic expressions of power. These stories reflected a strong inhibitory sense of disciplined use of power. In fact the latter expression of power appeared to be the type most closely correlated with individuals actually holding management and leadership positions in organizations (McClelland, 1975: 258-259).

Characteristics of n Pow. Membership and holding office in civic and professional organizations is one manifestation

of high n pow. McClelland (1975) discusses several other manifestations of power such as excessive drinking of alcohol and owning prestige possessions in social and interpersonal power contexts. However, the basic n pow concern within work organizations is influencing the performance and behavior of others. For a leader or manager to be effective the need must be strong relative to other needs and must be exercised in a controlled and disciplined manner. Anyone, whether high or low in n pow, may be placed into a position where power and influence are necessary aspects of the task. It would appear, though, that those individuals who are highly aroused by and obtain satisfaction from work outcomes involving influencing others are more likely to be effective in such jobs. These persons should be more interested in those factors affecting influence such as the personal characteristics of those over whom influence must be exercised, the characteristics of the organization, and the managerial skills necessary to integrate activity toward organizational effectiveness. The work of Pollard and Mitchell (1971) emphasizes the legitimacy and necessity in most organizational situations of the manager's role in influencing the perceptions of others to attain organizationally desired behaviors. The actual effectiveness of managers in exercising power depends upon other qualities in addition to n pow (McClelland and Burnham, 1976). Possibly, the two most important are managerial style and power maturity.

Negative perceptions of power generally cause one to associate power with autocratic and authoritarian managerial styles.

However, McClelland's research indicates that such managerial styles tend to be more correlated with low need for power. In fact a person truly concerned about influencing others quickly realizes that influence is most effective when the individual makes others feel strong. Authoritarian styles have just the opposite affect. Maturity is best understood with respect to four power orientations. At the lowest orientation the individual derives strength from others. At the next orientation the individual learns that feelings of power can come from self-assertiveness and self-control. Individuals with the third orientation see themselves as origins of influence and impact over others. In the final orientation an individual influences others for the good of a higher authority (the group, the organization, the state, mankind or universal science). Maturity arises when individuals can adapt their orientations to the situations facing them (both on and off the job). High n pow and organizational effectiveness are positively correlated with stage three and four orientations, whereas individuals in the second stage are likely to describe work as tedious and boring. Stage two individuals are also likely to reject authority of any kind (McClelland, 1975: Ch 2-3). Although the discussion of power has focused upon managerial activity, the principles apply to any type of job in which influence of the actions of others is important.

There is no one-to-one correspondence of either the positive face of power (characterized by influence) or the negative face of power (characterized by dominance and self aggrandizement) with organizational effectiveness in all situations. In fact

the effective wielder of power may be the one who knows which face to express. An interesting aspect of power behavior found by McClelland is the moderating effect of the need to be liked.

Need for Affiliation

The need for affiliation is a natural motive that seems to manifest itself to some degree in everyone's life. Intuitively one might conclude that developing and maintaining friendly, close relationships with other persons (outside of one's family) would be a prerequisite to creating a healthy organizational climate. Empirically this appears to be true only as far as informal group relationships are concerned. Research by McClelland and others (Boyatzis, 1974: 183) supports the view that concern for close, assuring interpersonal relationships within work contexts lead to behaviors which are generally incompatible or at best uncorrelated with organizational effectiveness. This precept is especially valid when superior-subordinate relationships are involved. In McClelland's view a manager with a high need for being liked is precisely the one most concerned about staying on good terms with others and, therefore, most likely to make exceptions in applying organizational rules and policies. Such an individual places the well being of specific individuals above the well being of all individuals collectively (McClelland, 1975: 204; 1976: 103).

Affiliation has not generally been found to be a significant independent variable in the study of organizational performance except in cases where group processes or informal group structure has been challenged or threatened (deCharms, 1957). The effect and importance of the affiliation motive is more a function

of the strength of the motive relative to other important motives.

Need Configurations

McClelland presents a taxonomy of n pow - n aff combinations that seems to reflect generalized behavior patterns of individuals and groups (including nations). These patterns include the personal enclave power system, the empire building motivational syndrome, and the conquistador motive pattern. Of greater interest to this research is the configural relationship among achievement, power, and affiliation motives for several vocational groups (Figure 2).

Summary

The research of McClelland tends to support the idea that three main motives permeate the attitudes and performance of individuals in work organizations. The first motive, need for achievement, is characterized as a desire to accomplish difficult (but feasible) goals and to later receive detailed information about one's personal performance. The second motive, need for power, is characterized as a desire to influence the activities or thoughts of a number of individuals. The third motive, need for affiliation, is characterized as a desire to establish and maintain close assuring relationships with other persons. The characteristics of certain jobs in various work organizations interact with these motives to infer various ideal patterns of motivations by members in those jobs.

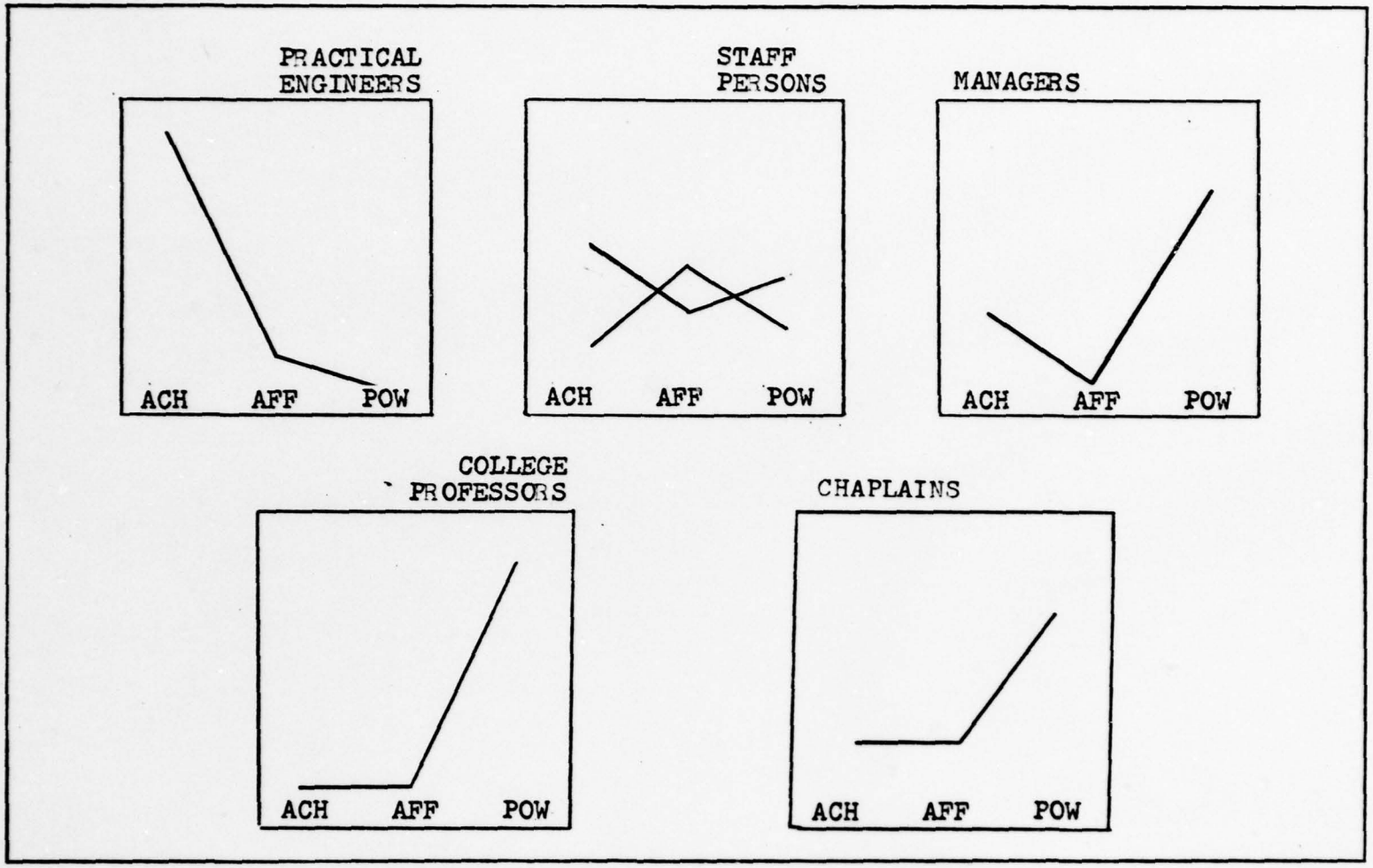

Figure 2. Predicted Motive Profiles of Selected Vocations
Source: NAECON Proceedings, Stevens and Krochmal, 1976

III. Research Methodology

Policy-Capturing

Policy-capturing is essentially a methodology to describe how a decision maker combines and weights informational cues in making a decision (Hoffman, et al., 1968: 338). The use of the methodology is well established in studying task or technologically related decisions (Libby and Lewis, 1977; Slovic, et al., 1977). If task decision behavior is assumed to be a subset of the more general set of individual human behavior, then extension of policy-capturing to the modeling of "motivated" behavior would appear logical. Hammond (1966) and Hoffman (1960) and their associates have provided probably the most extensive developments of the theory. The use of the theory in this research centers upon the representation of human information utilization as a linear multiple regression model. By specifying the information or cues upon which an individual bases a set of decisions, the importance of the cues in the individual's decision "policy", as well as the consistency with which the policy is used, can be analyzed.

As Hoffman (1960) points out, the purpose of judgmental modeling is not to model the mental process per se. Rather the purpose is to derive a mathematical model which effectively predicts judgments for a given set of information. While human behavior is considered by some to be too complex and intuitive to simplify with a linear mathematical model, research has shown differently (Dudycha and Naylor, 1966; Goldberg, 1968, Hammond

et al., 1964; and Slovic and Lichtenstein, 1971). Although inclusion of interactions among cues (Hoffman, 1960) and inclusion of non linear terms (Hammond and Summers, 1965) may be relevant under certain circumstances, these enhancements generally do not improve predictive power over simple linear models.

In policy-capturing the researcher determines which specific information is of interest in the study. The information is reduced to a set of categorical variables (cues) which can be described by at least an ordinal scale of values. A set of cues - one value from the range of each of the informational variables - is presented to which the decision maker must respond in some numeric or quantifiable fashion. The variance in responses (decisions) that an individual makes over several such different combinations of cue values provides the basis for least squares multivariate regression or other correlational analysis. The output of the regression analysis provides a coefficient of regression (beta weight when the coefficient is standardized to unit variance) for each cue presented to the decision maker. The beta weights (b) indicate the emphasis or importance attached to each of the cues in making the choices. The analysis also provides a squared coefficient of correlation (R^2) which represents the degree to which the linear model based on the beta weights predicts the actual choices of the individual (Hoffman, 1960). While the process appears artificial and unrealistic, research by Brown (1972) indicates otherwise. In a comparison of decision models derived in natural and contrived

situations Brown found that the models agreed very closely. In addition, policy-capturing models have consistently been shown to be more reliable than subjective models reported by the decision maker in predicting decision behavior (Slovic and Lichtenstein, 1971: 684).

According to Hoffman (1960: 120) direct comparison of b's across subjects is generally not meaningful unless individual decision models have similar R^2. And, unless the decision cues are uncorrelated (orthogonal), beta coefficients will not account for all of the variance in a model or allow for assessment of the independent contribution of cues to the decision process. For these reasons, orthogonally designed decision exercises are generally prefered (James, et al., 1975: Ch 4) and make possible the calculation of relative weights (RW) for each of the cues (Ward, 1962). The relative weight for the i'th cue can be calculated as -

$$RW_i = b_i^2/R^2 \quad \text{(Appendix C)}.$$

The relative weight statistically represents the relative contribution of the cue to the proportion of variance (R^2) explained by the total regression model. In general, R^2 is equal to the sum of the square simple correlations of each cue with the decision variable. In an orthogonal set of cues, standardized beta weights are equivalent to the simple correlations. Therefore:

$$R^2 = b_1^2 + b_2^2 + b_3^2 + \ldots b_k^2 \quad \text{(Appendix C)}.$$

There are methodological issues associated with the choice between beta weights or relative weights as the more theoretically sound measure of need importance. Beta weights in models with very high R^2 theoretically should correspond directly with the "absolute or true" need strengths. However, as an individual's consistency (R^2) decreases so do the magnitudes of the beta weights. As R^2 decreases the error in the model increases. It is because of this error that some authors contend that direct comparisons of individual models with differing R^2 leads to ambiguous results. Hoffman (1960) proposes the relative weights as a means to overcome this problem.

However, in motivational policy-capturing exercises the R^2 may be reduced not only by cognitive or pure error but by the failure of one or more cues to arouse an affective response from an individual. This research addresses achievement, power, and affiliation as intrinsic work motivations. As Sims and Szilagyi (1976: 213) point out,a "substantial proportion of workers do not view their work as particularly important and, therefore, may well attach relatively low valence to the intrinsic outcomes associated with successfully performing a job." As a result, some subjects may feel that the cues presented in a motivational decision exercise are "incomplete" or outside the subjective set of cues perceived as important to the choice at hand. One can infer that no model for predicting behavior will operate well if the motive pattern of the subject differs from the cue pattern of the situation (McClelland and Teague, 1975: 284-285). When small beta weights result from other than consistent cue usage,

then,division by small R^2 results in relative weights that over compensate for this latter form of decision-error. Under these circumstances relative weights are even more ambiguous than beta weights for across persons comparisons.

Another methodological problem might arise when a beta weight has a negative sign. Negative weights imply a different concept (for example, fear of failure in the case of n ach) than a positive one. There is no inherent problem associated with analyzing negative beta weights. The analysis problem arises when the beta weights are squared to calculate the relative weights. In doing so the negative signs, which imply avoidance rather than importance, are lost and a negative beta weight may now have as large a relative weight as a positive beta. For analysis purposes an additional variable to account for this situation might be derived by rescaling the relative weights associated with negative betas to zero. The objective of doing this would simply be to factor out any ambiguous effects of the affected relative weights. This procedure is analogous to McClelland's scoring of TAT in which stories with no or negative achievement imagery are scored zero and only if positive imagery is found on the initial scoring is a story further scored for need strength. As research into motivational policy-capturing develops a better method for transforming or scaling relative weights associated with negative beta weights may be found.

The Instrument

The instrument used in this research consisted of a three section survey. There were fourteen questions in the first section

for collecting various demographics including job experience, education, and performance data. In the second section were questions concerning perceptions and attitudes about the subject's current job. The last section was a policy-capturing exercise, copyrighted by Adrian M. Harrel and Michael J. Stahl, for the measurement of the importance of need for achievement, power, and affiliation. See Appendix A for a copy of the survey instrument.

Decision Making Exercise. The decision making exercise consisted of a full-factorial, orthogonally-designed, randomly-arranged sequence of job preference decisions. Each hypothetical job was described by the frequency with which affiliation, power, and achievement outcomes were present in the job. The descriptions of informational cues for each outcome were based on McClelland's definitions of the motives the cues were designed to arouse (Ch II, Summary). Each cue frequency took on one of three levels - rarely, fairly often, and very often. All possible cue level combinations (3x3x3=27 hypothetical jobs in all) were presented to the decision maker. The decision consisted of the likelihood that the individual would seek each hypothetical job. The basis for using a job choice scenario for measuring work motivation was the assumption that the motives underlying work behavior in general also influence the preferences of individuals toward specific potential jobs. The greater the frequency that valued outcomes are seen to be attainable by choosing a particular job, the more attractive that job becomes (Lawler, 1973: 88-94). Therefore, if outcomes of particular jobs are

known, for example opportunities for achieving, explicit statements of an individual's preferences toward several jobs involving opportunities for achieving could be used to infer the importance of achieving to that individual. In this instrument only the levels of achievement, power, and affiliation outcomes were varied from job to job and the subjects were instructed to consider all other factors constant among jobs. After the decision making exercise, each subject was requested to distribute 100 percentage points among the three cues as a subjective measure of the perceived relative importance of the cues to the individual's decision policy.

Other Variables in the Survey. The primary interest in this research was upon the usefulness of policy-capturing in measuring work motives. One aspect of verifying the usefulness was to determine the relationships of policy-capturing measures of affiliation, power, and achievement needs with job performance and job satisfaction. Therefore, several measures of performance - productivity, Officer Effectiveness Reports (OER), and academic grade point average - were collected depending on the sampled population. In addition, overall job satisfaction was measured using the Hoppock (1935) satisfaction questions.

There are many other factors which may moderate the relationships between needs, job performance, and job satisfaction. Ability, which is a function of aptitude, training, education, and experience, is a factor which effects any measure of performance. Data were collected on these ability indicators in the demographics. Job characteristics, satisfaction with specific job facets, and

the relative importance of extrinsic versus intrinsic outcome importance have been found to mediate the relationships among these factors (Lawler, 1973: Ch 3 and 4). Data were collected on some of these factors with a series of Porter type questions (Porter and Lawler, 1968) for each of the motives. The questions elicit subjective responses as to the importance, the "is now", and the "should be" frequencies of achievement, power, and affiliation outcomes in the respondent's current job. A question from Gailbraith and Cummings (1967), which is designed to be an overall measure of the degree to which an individual finds a job intrinsically motivating, is included in the instrument.

Sample Populations

One objective of this research was to investigate vocational predictions of policy-captured motive measurements. Therefore, samples from several diverse vocational groups for which McClelland and his associates have developed motive profiles (Ch II) were selected. The survey instruments were distributed as widely as possible within each sample to obtain a broad data base with respect to age, experience, job level,and performance. Participation was strictly voluntary and each individual was given the opportunity to receive policy-capturing feedback. No explicit reference to affiliation, power, or achievement motivations was made to the subjects. The survey instruments were distributed through individual work sections and returned to the researcher by mail or to collection boxes. Surveys were considered usable only if all decisions in the third section were completed and the

variance across all 27 decisions was greater than zero. Otherwise, no beta weights could be calculated by the regression program.

The specific populations sampled were as follows:

(1) Air Force Avionics Laboratory (AFAL), Wright-Patterson AFB, Ohio. The respondents were primarily engineers and scientests, although some senior managers also responded. A total of 475 exercises were distributed and 174 usable exercises were returned for a 37% response rate.

(2) Air Force Institute of Technology (AFIT), Wright-Patterson AFB, Ohio. Respondents were professors in the School of Engineering and the School of Systems and Logistics. A total of 95 exercises were distributed and 38 usable exercises were returned for a 40% response rate.

(3) Air Force Institute of Technology, Wright-Patterson AFB, Ohio. Respondents were students in the School of Engineering and the School of Systems and Logistics. The sub-population generally consisted of engineers, managers, and staff persons. A total of 347 exercises were distributed and 156 usable exercises were returned for a 45% response rate.

(4) Air Force Chaplain's Orientation School, Maxwell AFB, Alabama. Respondents were newly commissioned active duty Protestant and Catholic chaplains. A total of 28 exercises were distributed and 27 usable exercises were returned for a 96% response rate.

Data Analysis Procedures

All responses on the survey were in numeric form which

facilitated transcribing and keypunching the data on to computer data cards. The data were directly input to a specially written regression analysis program (Appendix D) that calculated regression statistics and significance values for each respondent. The program wrote these data as well as the demographic and job factor data to a disk file (and computer cards) that was used for all subsequent analyses. The format of the raw input data and the transformed data is shown in Appendix B. The Aeronautical Systems Division (ASD) CDC6000 CYBRE 70 computer and software packages available to AFIT were used to perform the analyses.

Regression Analysis. Regression analysis based on least squares methodology was used to calculate the beta weights for each subject. The specific technique used was based on the equation -

$$b = (X'X)^{-1} X' \quad Y$$

where

b is a column vector of standardized regression coefficients (beta weights),

X is the standardized matrix of all values of the orthogonal cues in the decision exercise,

Y is the standardized column vector of decision responses.

The derivations and special data arrangements required for performing these calculations are shown in Appendix C. The columns of matrix X represented the affiliation, power, and achievement cues, respectively. The values for each cue, which could take on a value of rarely, fairly often, or very often in each respective hypothetical job were entered into the X matrix. Each element of Y corresponded to each row of X and represented

the actual likelihood measurement of the decision maker. Once input to the FORTRAN regression program, the data were standardized, reformatted, transformed,and multiplied using a FORTRAN matrix multiplication subroutine. The reformatting made calculation of the beta weights for the affiliation, power, and achievement cues as well as interactions among the cues possible. From the beta weights an R^2 for the simple, three-cue model and the interactive, seven-cue model were calculated. F-statistics and significance levels for each beta, R^2, and interactive - versus - simple model were also calculated. The policy-capturing data for all of the population groups was also arranged into subfiles for input into SPSS subprogram REGRESSION (Nie, et al., 1975) to determine overall population beta weights and R^2.

FREQUENCIES, T-TEST, and MANOVA. First, the SPSS program FREQUENCIES was used to generate an informative frequency distribution of demographics, job factor variables, beta weights, relative weights, subjective weights, and regression R^2. Subprogram MANOVA (Multivariate Analysis of Variance) was used to compare the equivalence across the entire sample between relative weights and subjective weights. Paired T-TESTS were used to determine if the interactive model resulted in significantly higher R^2 than the simple model.

The data were partitioned into the five vocations of interest in this research - engineers, managers, staff persons, professors,and chaplains. MANOVA was used to investigate equivalence among the need profiles of these vocations. Group T-TESTS were used to determine the association between high and low need

strength and measures of productivity, performance,and overall job satisfaction. These analyses were performed on the overall and AFAL, professor, and student subpopulations. Because no clear cut a priori assumptions as to whether beta weights or relative weights were theoretically better as need measures and because of the methodological problems mentioned earlier in this chapter, both sets of measures were used in the analysis. In addition the adjusted relative weight proposed earlier in the chapter was calculated although no extensive analyses were performed with the measure.

IV. Data Analysis Results

An analysis of the data collected in this research is presented in this chapter. Due to the sheer volume of the data collected, the scope of the analysis was narrowed to that of investigating the feasibility of policy-capturing to describe work motivation. The organization of this chapter is based upon the four objectives of the research - application of policy-capturing to measure need importance in several Air Force populations, comparison of policy-capturing results with subjective measures of need importance, determining the configural association between need importance and vocation, and determining how well policy-capturing measures can be used to predict job performance and job attitudes.

Application of Policy-Capturing

The answers to several questions are of interest in determining the feasibility of applying policy-capturing to work motivation. First, to what degree do the cues have cognitive meaning to the respondent and can the individual respond "rationally" to the instrument? Secondly, would a model which includes interaction of cues be significantly more reliable than a simple linear model. And thirdly, how homogenous are the decision policies across individuals?

Cognitive Meaning. The policy-capturing exercise did appear to have moderate to high cognitive meaning to the respondents. The histograms of R^2 values for both the simple,

three cue model and interactive, seven cue model are shown in Figure 3. The mean R^2 for the simple model was .67, 50% of the respondents had an R^2 greater than .72, and 70% had an R^2 between .6 and .9. Similar results, although of greater magnitude, are shown for the interactive model. Only 6% - 7% of the subjects had R^2 in both models which could not be considered statistically different from zero at the $p < .05$ significance level. These statistics lend support to the fact that motivational information cues can be used consistently by subjects in policy-capturing models. In addition, the cues for achievement, power, and affiliation taken together do affect the decision making behavior for most subjects.

Simple versus Interactive Models. The results of paired t-tests between the simple and interactive models yielded an R^2 greater than the simple linear model at a level of significance of $p = .001$. Individually, only about 19% (73) of the R^2's were increased significantly ($p < .05$) by considering interaction terms and less than half of these (35) had R^2 less than .6 initially. Only about 2% (9) of the persons had an R^2 increase of .2 or greater. No particular pattern was found among the interaction beta weights. Because of the relatively small proportion of the sample affected by interactions and because of the ambiguity the interaction terms may have in this research, only the simple linear model outputs were used for all subsequent analyses in this chapter.

Homogeneity of Need Measures. The histograms of beta weights, unadjusted relative weights, adjusted relative weights and subjective weights for n ach, n aff, and n pow are shown in Figure 4 to

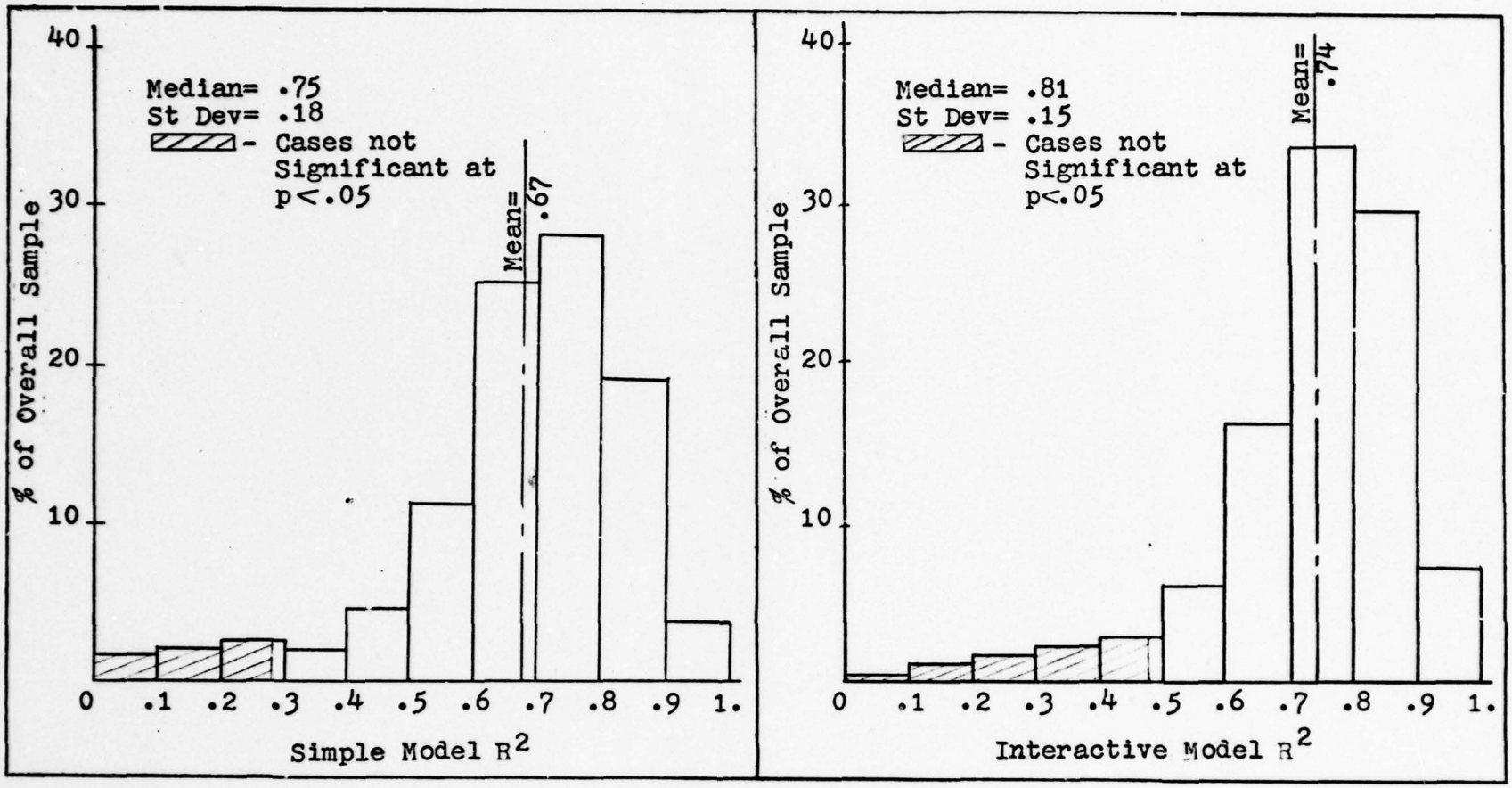

Figure 3. Distribution of Individual R^2

Figure 15 respectively. It does appear that most persons attach at least some weight to one or more of the needs in making the job choice decisions. One might notice that a fair proportion of the sample placed a nil (0-.1) or negative value on the need weights (beta and relative weights) and over 30% (134) of the sample had a negative beta weight for at least one need. The distribution of relative weights further implies the dichotomy of need importance among individuals suggested by McClelland.

A comparison of the group regression R^2's with the mean R^2's in Table I indicates that the need strength measures were very non-homogeneous. In the overall sample the mean R^2 of .67 for the within-individuals models dropped to .29 for the across-individuals model. Such non-homogeneity would be expected from the discussion of needs in Chapters I and II. As a whole, the sample placed a greater weight upon n ach than either of the other

TABLE I

Regression Relative Weights and R^2 for Grouped Policy-Capturing Models

Sample	N	Group Relative Wts Ach	Aff	Pow	Group R^2	Mean R^2
Overall	395	.524	.263	.213	.285	.669
AF Avion Lab	174	.585	.208	.207	.258	.650
Professors	38	.418	.369	.213	.375	.749
Chaplains	27	.288	.430	.282	.156	.579
Students (All)	156	.520	.273	.207	.338	.686
Group A	20	.587	.196	.217	.512	.769
Group B	30	.338	.417	.245	.353	.706
Group C	30	.663	.183	.155	.362	.660
Group D	76	.513	.280	.207	.299	.667

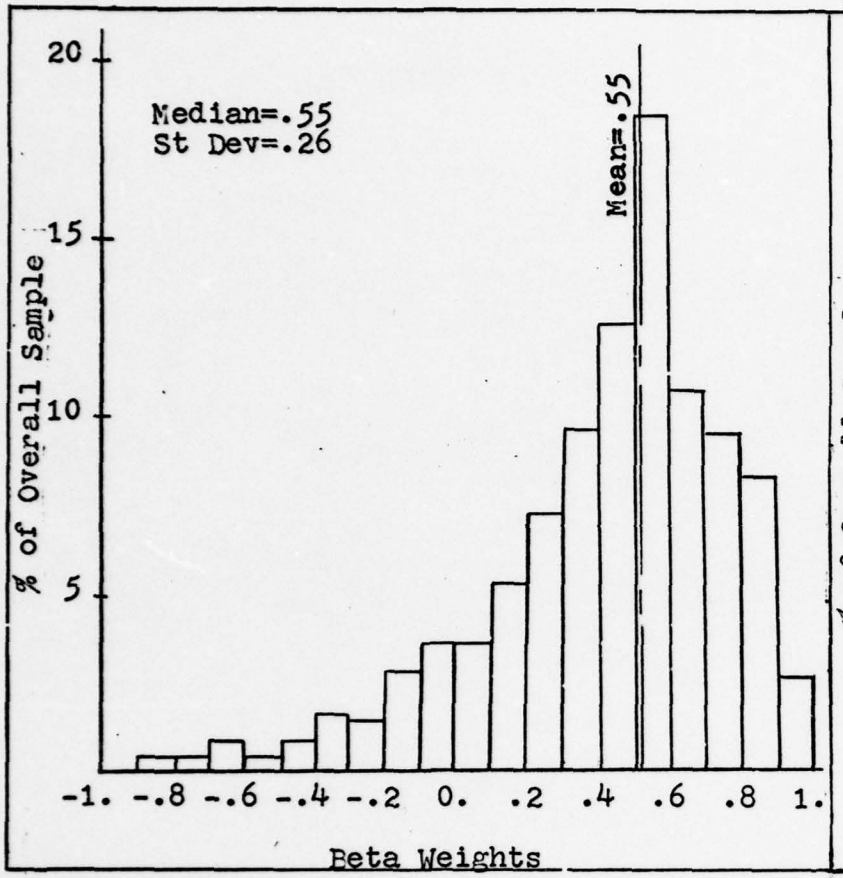

Figure 4. Distribution of N Achievement Beta Weights

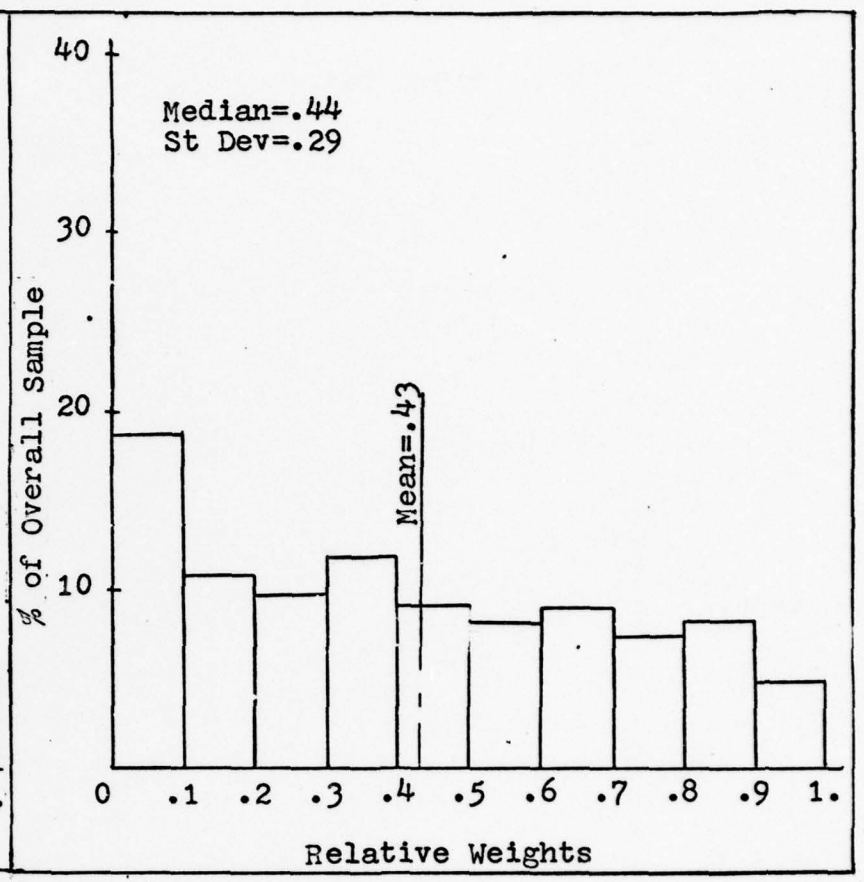

Figure 5. Distribution of N Achievement Relative Weights

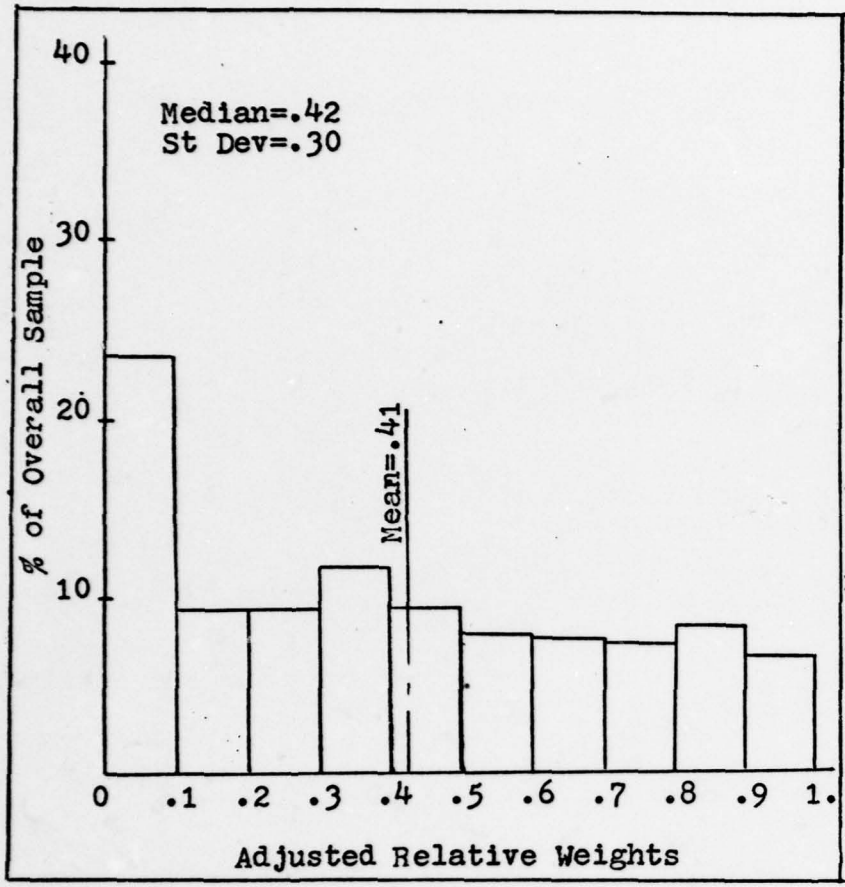

Figure 6. Distribution of N Achievement Adjusted Relative Weights

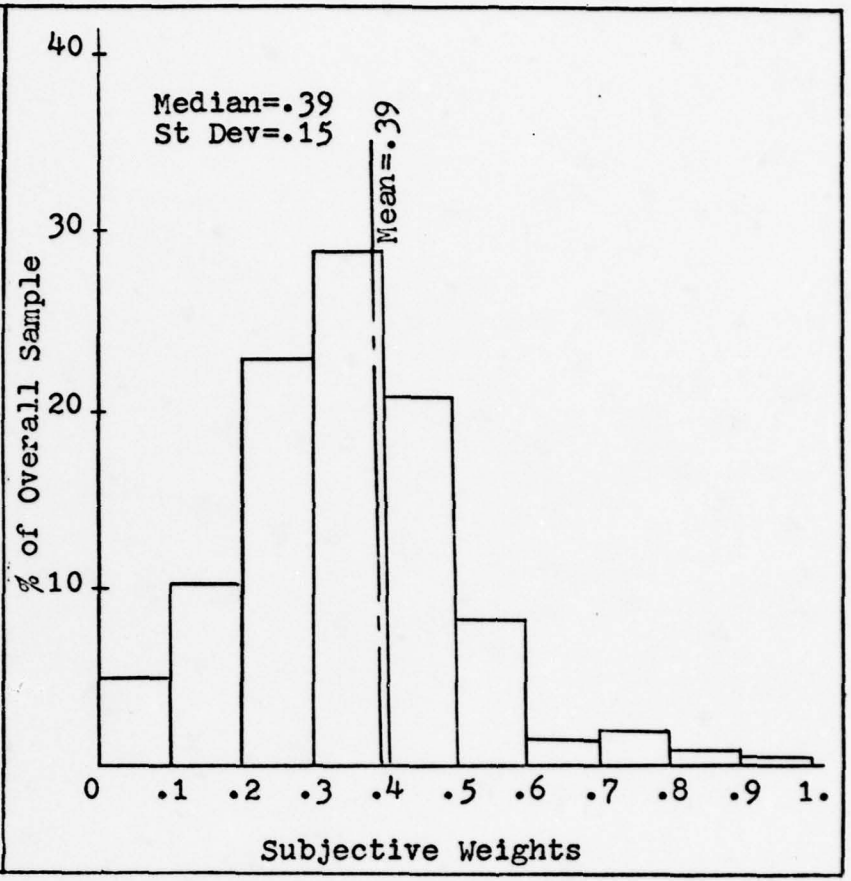

Figure 7. Distribution of N Achievement Subjective Weights

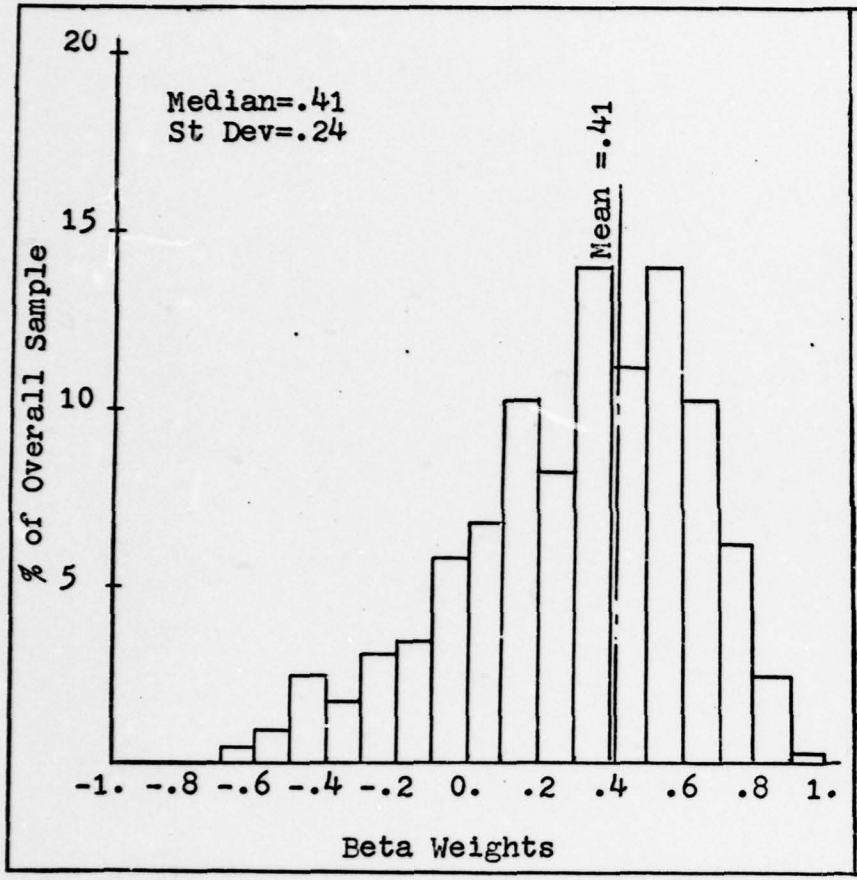

Figure 8. Distribution of N Affiliation Beta Weights

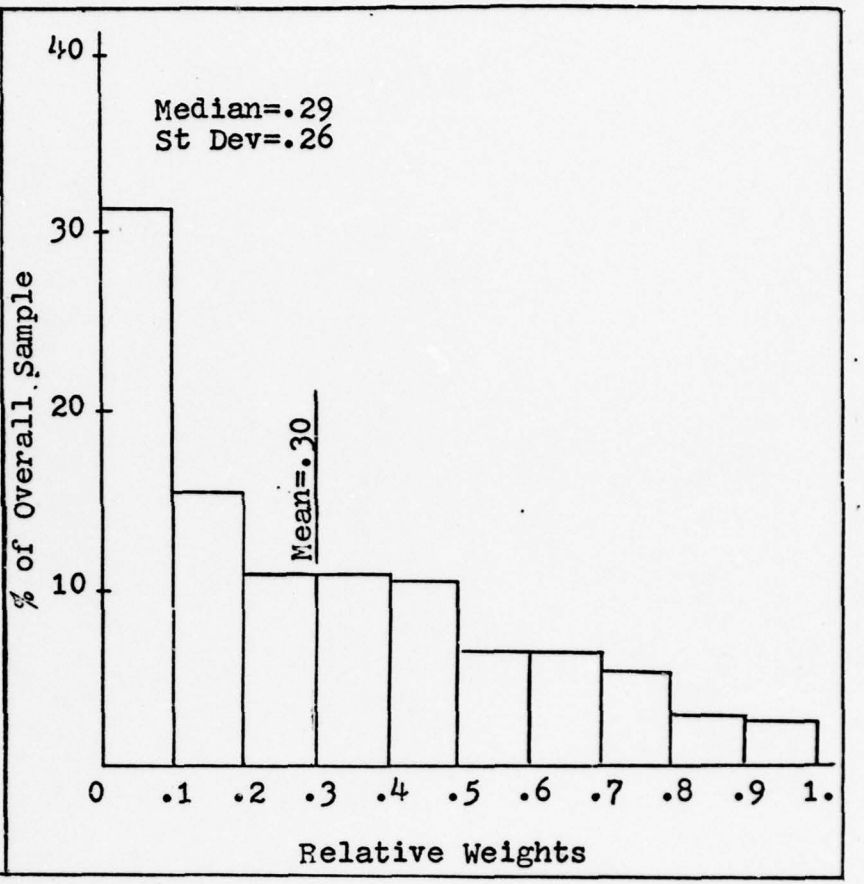

Figure 9. Distribution of N Affiliation Relative Weights

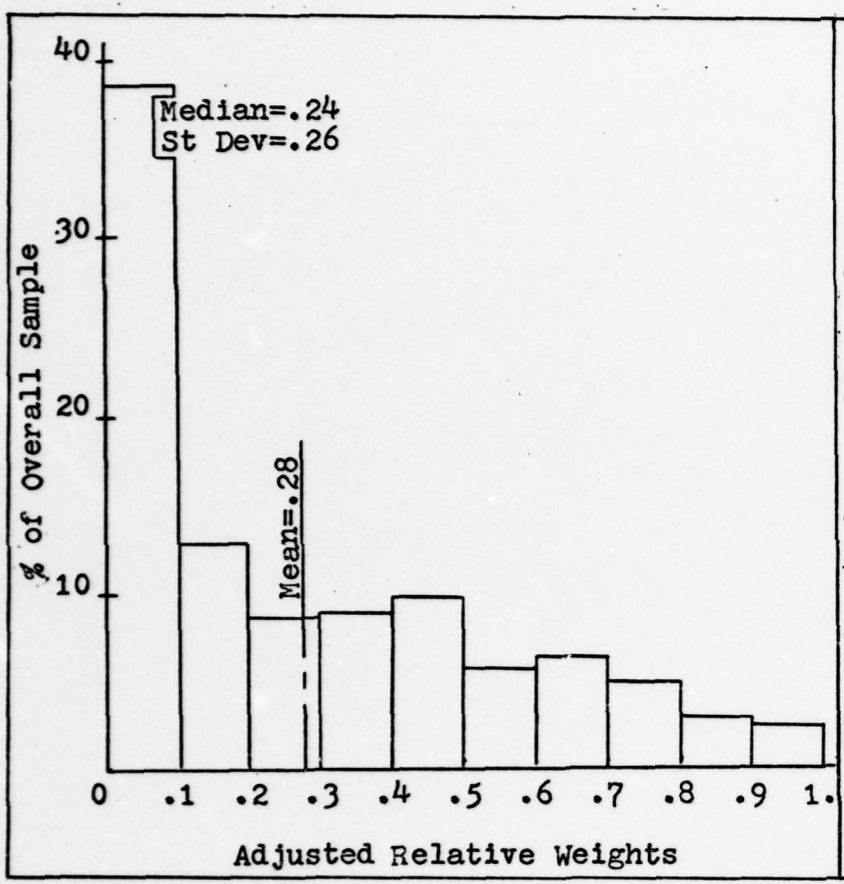

Figure 10. Distribution of N Affiliation Adjusted Relative Weights

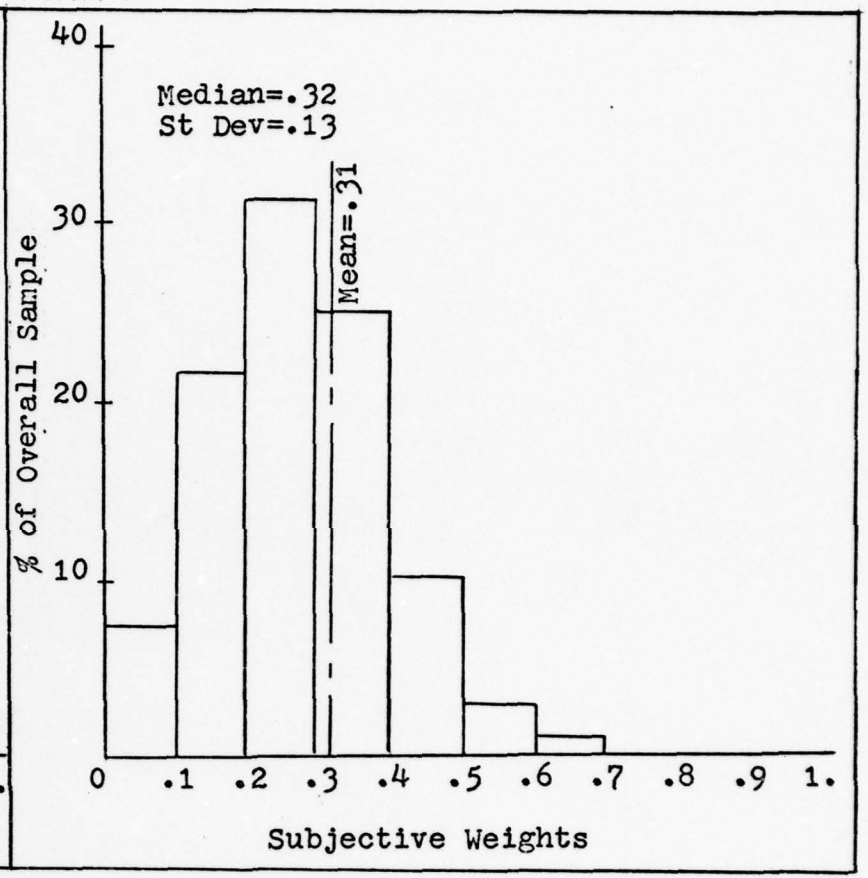

Figure 11. Distribution of N Affiliation Subjective Weights

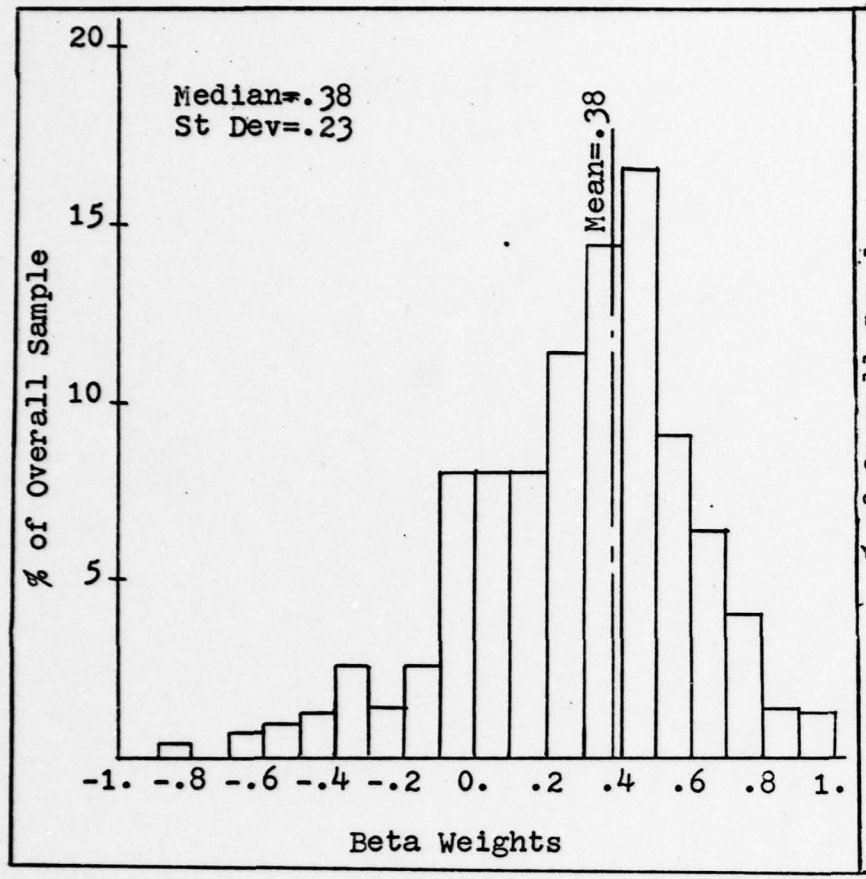

Figure 12. Distribution of N Power Beta Weights

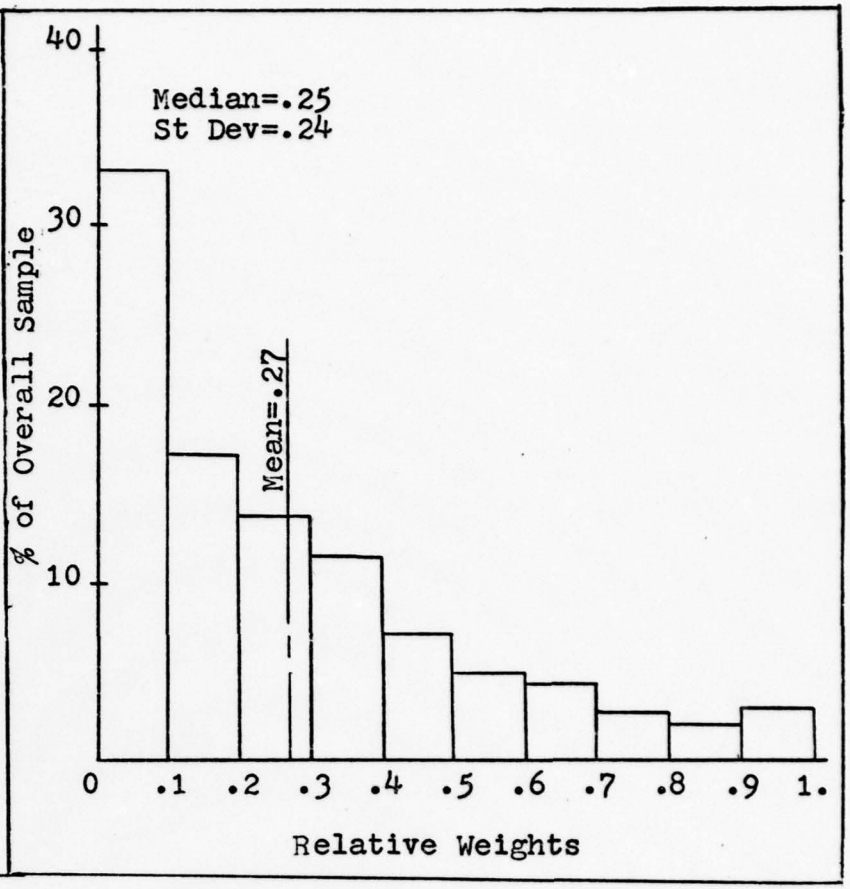

Figure 13. Distribution of N Power Relative Weights

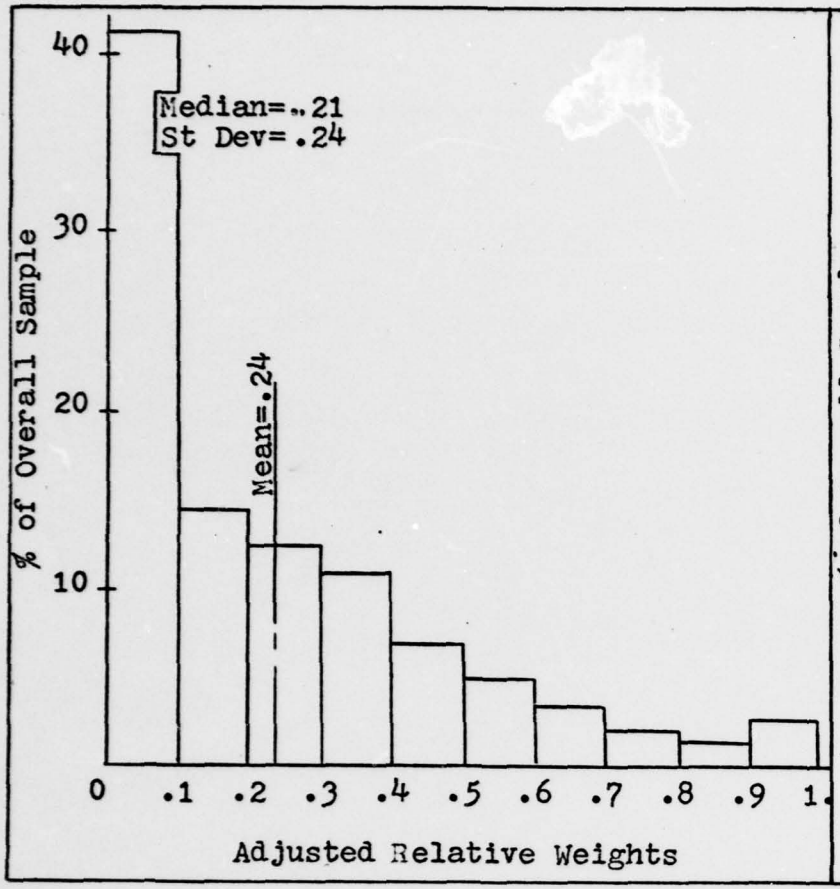

Figure 14. Distribution of N Power Adjusted Relative Weights

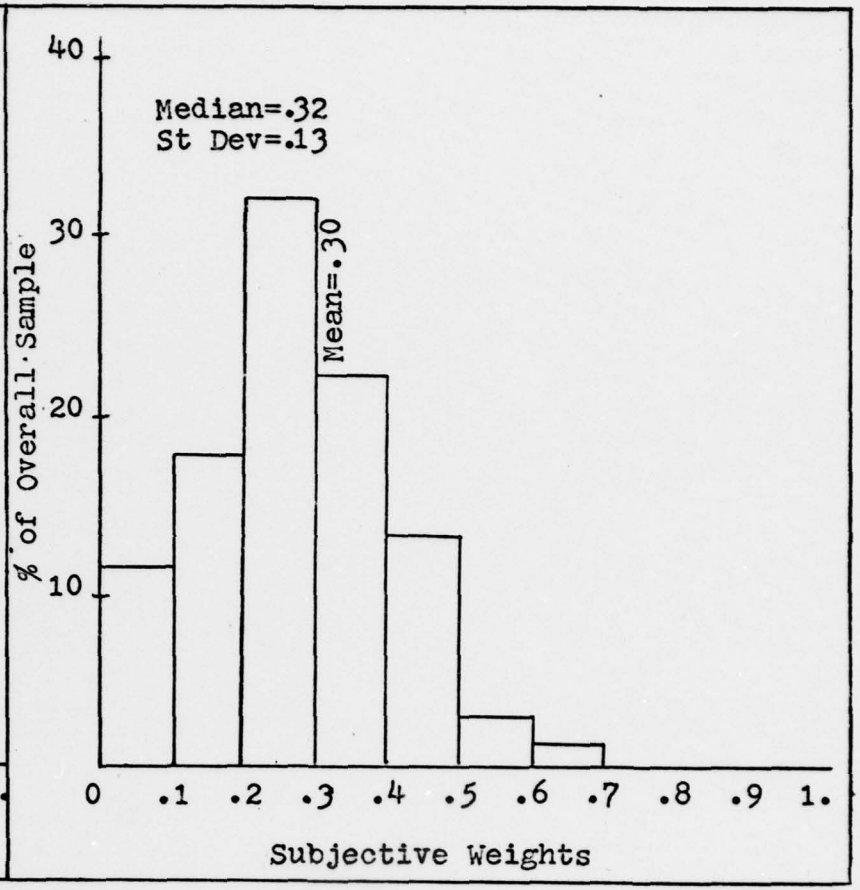

Figure 15. Distribution of N Power Subjective Weights

needs. This result might be predicted from McClelland's hypothesized need structure of engineers and the large proportion of engineers and persons with engineering background in the sample. Statistical tests on the need configurations of vocational groupings are shown in the third section of this chapter. Frequency distributions for the sample population demographics are presented in Appendix E.

Subjective versus Relative Weights

One can infer from Figures 7, 11, and 15 that individual self reports of need importance generally would be less reliable than more objective measures of need strength. Each of the three distributions is similarly distributed (means = .39, .31, and .30 respectively; standard deviations = .15, .13, and .13 respectively). The subjective weights were conservatively distributed near the mean with a very small proportion of the subjects reporting either very large or very small need importance. The subjective weight distributions do not reflect the

TABLE II

MANOVA F Statistics for Comparison of Subjective Weights with Relative Weights

Variate	DF n_1	DF n_2	F_o	p
Overall	3	786	3.05	.03
Achievement	1	788	6.55	.01
Affiliation	1	788	.04	.83
Power	1	788	7.16	.01

H_o: SW=RW; Reject H_o if $p<.05$

"realities" of wide variations in need strength as expounded by most organizational psychologists. Using multivariate analysis of variance, only the affiliation subjective and relative weights were not statistically different at $p<.05$ (Table II).

Vocational Need Configurations

The data were partitioned into subsamples according to the five major vocations in the sample. Partitioning was based solely upon the respondent's self reports of vocation. The engineers group consisted of individual's responding as either an engineer or a scientist. The staffers group consisted of persons responding as either a staffer or an administrator. The subsample sizes, mean beta weights, mean unadjusted relative weights, and mean adjusted relative weights are presented in Table III. The data for beta weights and unadjusted relative weights are shown plotted as profiles with McClelland's predicted profiles in Figure 16. Although numerically different, the beta weight and relative weight profiles within each vocation are graphically similar. Need for achievement tended to dominate each of the profiles and need for power tended to be the subordinate variable in each profile. The engineer, management, and staff vocational groups demonstrated profiles similar to the predicted profiles. In each of these profiles the direction of the mean weights was as hypothesized though more conservative than predicted.

Table IV shows the F statistics derived from MANOVA to test the hypothesis that there are no differences between profiles of specific need strengths across vocational groups.The beta weight

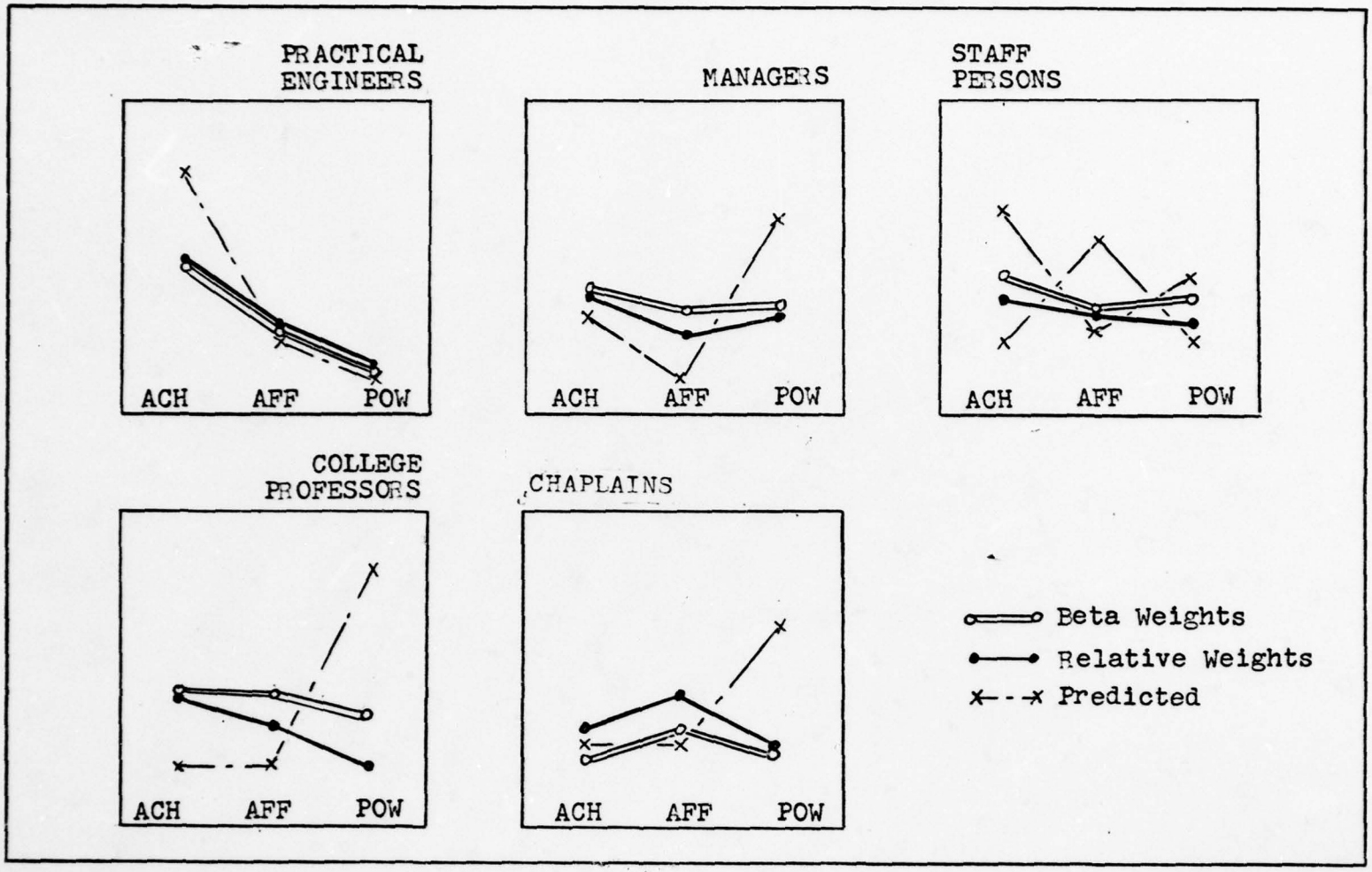

Figure 16. Comparison of Predicted Need Profile, Beta Weight Profile and Relative Weight Profile for Selected Vocations

TABLE III

Comparison of Mean Beta Weights, Relative Weights and Adjusted Relative Weights for Data Partitioned by Vocation

Type	Vocation	N	Ach	Aff	Pow
BETA WTS	Engineers	173	.464	.273	.214
	Managers	70	.413	.328	.361
	Staffers	48	.445	.334	.361
	Professors	38	.416	.413	.361
	Chaplains	28	.223	.302	.238
REL WTS	Engineers	173	.473	.288	.238
	Managers	70	.395	.272	.331
	Staffers	48	.376	.327	.297
	Professors	38	.409	.316	.274
	Chaplains	28	.323	.414	.262
ADJ REL WTS	Engineers	173	.453	.259	.190
	Managers	70	.381	.262	.315
	Staffers	48	.369	.295	.292
	Professors	38	.387	.311	.265
	Chaplains	28	.272	.342	.241

and adjusted relative weight profiles were in fact statistically different at least at $p < .05$ over the whole sample. The table also shows that need for achievement and need for power were the variables which made the most significant distinctions among need profiles.

TABLE IV

MANOVA F Statistics for Comparison Across Vocational Profiles of Mean Beta Weights, Mean Relative Weights and Mean Adjusted Relative Weights

Variable	DF n_1	DF n_2	Beta F	Beta p	Rel Wt F	Rel Wt p	Adj RW F	Adj RW p
Profile	12	1053	3.17	.00	1.37	.18	2.52	.00
Achievement	4	351	3.52	.01	2.50	.04	2.70	.03
Affiliation	4	351	1.65	.16	1.70	.15	.84	.50
Power	4	351	4.59	.00	1.98	.10	4.12	.00

H_o: Profile 1 = Profile 2 = ... Profile n
Reject H_o if $p<.05$

Job Performance and Job Attitudes

In this section the relationships among need measures, performance and productivity measures, and job satisfaction are presented. An initial Pearson product moment-analysis on the sample as a whole and on the AFAL, professors, and combined student subpopulations resulted in no correlations greater than .15 among any of the variables. Using group t-tests two null hypotheses were investigated. The first hypothesis was that there were no differences in performance, productivity, or job satisfaction between individuals with high need strength and low need strength for at least one need. The second, which is converse to the first hypothesis, is that there was no difference in at least one need strength between persons in high and low productivity or job satisfaction groups. The beta weights, adjusted relative weights, and normal relative weights were split into low and high groups using .5 as the criterion. This value was chosen because it was high

enough above the mean to represent a hard criterion for high need strength. It was also a value which should fit the theoretical description of high need strength. As the analysis turned out, the relationships did not appear to be sensitive enough, with possibly two exceptions discussed later, for a different criterion to have made a drastic difference in the results. The productivity measures were split at the value "1" which represented a productive, non-productive dichotomy. Grade point average for students was split at 3.5, the Hoppock job satisfaction variable was split at the mean (21), and the average Officer Effectiveness Rating (OER) was split at 2.0.

In general, the adjusted relative weights had "better" significance levels in the anlyses than did either the unadjusted weights or beta weights. The magnitude and direction between the two sets of relative weights was comparable but the adjusted weights were more significant. There was little to no correspondence in results between beta weights and relative weights.

Overall Analysis. OER scores were associated with both n ach and n pow beta weights as shown in Table V. At a .05 level of significance both null hypotheses were rejected. However, the sign on the t-statistic was opposite the direction that might be initially hypothesized for the n ach comparison. The mean n ach scores for high (1-2) versus low (2 and greater) OERs were .41 and .49 respectively. Conversely, the high n ach group also had a lower (greater magnitude) mean OER score than the low n ach group. On the other hand, higher n pow was

TABLE V

Group T-Test of Relationship between
OER Score and Need Strength (Beta Weight)

Variable	Group Mean Beta OER LT 2	OER GE 2	t	DF	1-tail p
Achievement	.41	.49	1.80	208	.04
Affiliation	.36	.30	-1.43	208	.08
Power	.36	.28	-2.02	208	.02
	n=88	n=122			

H_o: Mean Beta (Hi Group) = Mean Beta (Lo Group)
Reject H_o if $p < .05$

Variable	Group Mean OER Beta GE .5	Beta LT .5	t	DF	1-tail p
Achievement	2.4 n=87	2.1 n=123	1.91	208	.03
Affiliation	2.3 n=50	2.2 n=160	.43	208	.33
Power	2.0 n=31	2.3 n=179	-1.69	208	.04

H_o: Mean OER (Hi Group) = Mean OER (Lo Group)
Reject H_o if $p < .05$

positively associated with the "better" OER scores and conversely better OER scores were associated with high n pow. Only n aff was associated with job satisfaction and only for the high versus low job satisfaction test. The mean n aff score for high job satisfaction (Hoppock greater than 21) group was .30 against .25 for the low job satisfaction group ($t = 1.73$, d.f. = 393, $p = .04$).

A series of group t-tests were performed to investigate the relationship between need configuration and OER score. The sample of individuals with OERs was partitioned using beta weights

into those with n ach greater than n pow and n aff, those with n pow greater than n ach and n ach greater than n aff, and a third group consisting of the remaining cases. The first group (n = 103) corresponded roughly with the ideal engineer and the second group (n = 23) corresponded roughly with the ideal manager configurations. The second group was found to have a higher (lower magnitude) mean OER score than the first (1.9 and 2.4 respectively). The result was significant at p = .03 (t = 1.93, d.f. = 30). Tests between the first and remaining group and second and remaining group were not significant.

AFAL Personnel. Using beta weights as the criterion variable the null hypothesis that there was no difference in productivity between individuals with high need strength and those with low need strength was tested using a group t-test at a .05 level of significance. There were no significant relationships found between beta weights and performance measures in the AFAL subsample. There were three productivity measures in which the hypothesis could be rejected for n pow relative weights. The three measures were writing technical memoranda, participation in technical or professional committees, and writing specifications and statements of work, and were inversely associated with need strength. These data are shown in Table VI. The direction of the t-statistic for the technical memoranda measure was plausible since theoretically a person with high n power would be more likely to influence others to produce than to do such work themselves. The committee participation t-statistic was opposite the direction hypothesized from McClelland's description of n pow. However, the converse of the null hypothesis

TABLE VI

Significant Group T-tests of Relationship Between Engineering Productivity and Need Strength (Relative Weights)

Measure	Need	Group Mean Prod RW GT .5	RW LE .5	t	DF	1-tail p
Technical Memos	Power	.19	.80	-2.15	162	.00
Prof/Tech Commit	Power	.16	.53	-2.28	172	.00
Specifications	Power	1.3	1.9	-1.84	92	.04

H_o: Mean Productivity (Hi Group) = Mean Productivity (Lo Group)
Reject H_o if $p < .05$

- there is no difference in need strength for producers versus non-producers - could not be rejected for any measure. It is interesting to note that several performance measures were significantly associated with the adjusted relative weights. These included technical memoranda, committee participation, and in-house studies. The statistical data for these are presented in Appendix E along with data runs for other variables not presented in this section.

There were several factors found to be related with overall job satisfaction. For example, individuals who published papers ($t = 1.73$, d.f. = 60, $p = .05$) and performed in-house studies ($t = 2.68$, d.f. = 164, $p = .00$) had greater job satisfaction than those who did not. Those with high job satisfaction participated in more professional or technical committees outside the job ($t = 1.85$, d.f. = 83, $p = .03$). No direct relationship between job satisfaction and OER score or need strengths was found.

Professors. The hypothesis that there was no difference in productivity for individuals with high versus low need strength could not be rejected for any of the betas, relative weights, or adjusted relative weights. A relook at the data showed that the n pow beta weight had an almost significant (.07) relationship with the publishing productivity measure. It is possible that a different n pow high-low cutoff point might have resulted in a more significant result since there was an imbalance of subjects between the two groups. Other t-test runs are presented in Appendix E. OERs were negatively associated with n ach relative weight ($t = 2.01$, d.f. = 36, $p = .02$). The low n ach group had a mean OER score of 1.76 versus the 2.37 mean score for high n ach. Only the n aff beta weight was significantly ($t = 1.73$, d.f. = 34, $p = .05$) associated with higher job satisfaction.

Students. The only overall association between student performance and need strength using t-tests was found for the n ach beta weight. For individuals with high n ach (ach$>$.5, n = 76) the mean grade point average was 3.6 versus a mean grade point average of 3.3 for those with low n ach (ach$<$.5, n = 49). The level of significance was $p = .02$ for $t = 1.97$ and 56 degrees of freedom. A .51 ($p = .00$) Pearson product-moment correlation was found between n ach and grade point average in the GSM-78S partition of the student subpopulation. No other significant product moment correlations were found in the other student groups.

V. Summary and Conclusions

Summary

The scope of this study was to investigate the feasibility of using policy-capturing to measure the strength of an individual's needs for achievement, affiliation, and power. The four specific objectives investigated were first, to apply the methodology, second, to compare the results of the methodlogy with self-reports of need strength, third, to compare the resulting need profiles for selected vocational groupings with predicted profiles, and fourth, to determine the relationship between need measures, performance measures, and job satisfaction.

Methodology. The methodology focused upon presenting concise descriptions from the literature of David C. McClelland of the needs for achievement, affiliation, and power as informational cues in a full-factorial decision making exercise. By varying the degree to which each of the cues as work outcomes was present across twenty-seven hypothetical jobs and by asking the respondents to rate the likelihood that each job would be sought, all other factors being constant, the "weights" that the respondent placed on each cue were captured.

The "weights", measured concurrently as standardized multiple linear regression beta weights and as relative weights, were theorized to reflect the strengths or importance of the needs corresponding to the cues. There were theoretical arguments for and against using either measure. The data analyses

were performed with a view toward determining which of the measures was the more significant in investigating the objectives. The SPSS programs FREQUENCES, T-TEST, and MONOVA were used to describe and test the data with respect to the four objectives.

Results. The first set of analyses supported the conceptual basis for using policy-capturing for measuring need strength. Across the total sample individuals responded to the decision making exercise rationally and consistently with at least 60% of the variance in over 70% of the individuals' decision making responses being explained by the policy-capturing models. Less than 7% of the respondents could not be significantly modeled using a non-interactive multiple regression model. As was expected, very little homogeneity of need importance was found across individuals in the sample. Need for achievement had the largest overall importance, need for power had the smallest and need for affiliation was the most stable across the total sample.

When the individual relative weights were compared with the individual's self reports of need importance the two measures were found to be significantly different with the excetion of the need for affiliation. This result supports other research findings that self reports of need strength are different from objectively derived measures (such as with policy-capturing) and would result in different statistical relationships with job performance and attitude measures. Policy-capturing need strength measures are, therefore, assumed to be

the more superior measure from a theoretical and methodological viewpoint.

The data were partitioned according to engineer, manager, staff person, professor, and chaplain vocations to compare vocational need profiles with the profiles predicted from McClelland's literature. Need for achievement again tended to be the dominant variable across all except the chaplain profiles. In this sample the engineers, managers, and staffers showed composite profiles similar to expected profiles. Profiles were found, however, to be significantly different across vocations. Need for achievement and need for power were found to be the variables that discriminated across profiles.

Need for power and need for achievement were found to be associated with productivity and need for affiliation was found to be associated with overall job satisfaction, although not to the degree hypothesized. In the overall sample "good" OER scores were associated with higher need for power. Higher need for affiliation was associated with higher job satisfaction. In the AFAL subpopulation, contrary to predictions, higher need for achievement was not associated with productivity using beta weights or relative weights. However, higher need for power was associated with lower productivity on technical memoranda, lower participation on professional and technological committees, and lower productivity of specifications and statements of work. In the professors subpopulation those individuals who published appeared higher in need for power than those who did not. Again, n ach did not appear to be associated with productivity as

predicted. In the overall student sample need for achievement was found to be positively associated with academic performance as predicted.

Conclusions

The results of this research do support the feasibility and practicality of policy-capturing as a need measurement methodology. Individuals can and did respond with reasonable consistency to the motivational decision making exercise. The informational cues used in this research did result in measures which were distinguishable across vocations. However, the fact that some need profiles and predictions of job performance and attitudes were not as predicted from previous research suggest further research and possible methodological refinements. Organizational, environmental, or other individual factors (such as education or ability) may have attenuated any monotonic relationships between motive strength and behavior that may have actually existed.

Recommendations and Suggestions for Further Research. The sheer volume of data in this research prevented a parsimonious clustering of individuals into homogeneous need groups for extensive analysis. Use of a computerized clustering technique called Judgmental Analysis (JAN) (James, et al., 1975) should contribute tremendously to future studies of the type in this research. It is also recommended in future uses of the decision making exercise that the cue for affiliation be reworded to capture more the essence of "assurance" type affiliation (Boyatzis, 1974). Aspects of Atkinson's theory of need for achievement

might also be incorporated (Atkinson, 1974). Future studies might investigate and separate the factors influencing R^2 (for example, irrationality of individuals versus the failure of the individuals to affectively respond to the cues). Future studies might also investigate whether equivalent relative weights based on high versus low R^2 result in differing profiles or associations with performance and job attitudes.

Although data were collected for many variables including demographics, ability and job scope, the expected effects of these variables on job performance and job satisfaction were not investigated. Future research might address the moderating effects of these variables as well as the effects of including extrinsic job motivation cues (pay, etc.) into the exercise. Since the ultimate objective in measuring need strength is predicting specific organizational behaviors, future research should be oriented toward an operational model of motivational policy-capturing (such as in a valence-expectancy-instrumentality formulation).

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APPENDICES

APPENDIX A

Research Instrument

This appendix contains a portion of the decision analysis exercise including the introduction, the demographic questions, and instructions and first and last pages of the decision making exercise. There were different versions of the performance measures (page 3) for the AFAL, Professor, and Student populations. All three of those versions are presented, respectively in the appendix.

A DECISION MAKING EXERCISE FOR AIR FORCE PERSONNEL

THIS IS NOT A QUESTIONNAIRE. It is a decision-making exercise to investigate how individuals make certain job-choice decisions. Your cooperation in this research will be kept strictly confidential. The data collected will support a master's thesis at the Air Force Institute of Technology but you will not be identified in the final report. Your cooperation is, therefore, sincerely requested.

The exercise is divided into three sections. Section I involves general information about yourself and Section II involves your feelings about factors relevant to your job. Section III involves decision-making with respect to several job choices. There are no"correct" or "incorrect" answers so please respond as candidly as possible. The information provided by you and other respondents will be combined to statistically test hypotheses about how information is used by Air Force personnel to make certain job-choice decisions.

If you would like to receive information about your overall response as compared with those of your contemporaries, please print your name and address in the space provided at the end of the exercise. A summary comparison will be mailed to you in confidence after completion of the study (September 1978).

PRIVACY STATEMENT

In accordance with paragraph 30, AFR 12-35, the following information is provided as required by the Privacy Act of 1974:

a. Authority

(1) 4 U.S.C. 301, Departmental Regulations: and/or

(2) 10 U.S.C. 80-12, Secretary of the Air Force, Powers and Duties, Delegation by.

b. Principal purposes. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DOD.

c. Routing Uses. The survey data will be converted to information for use in research of management related problems. Results of the research based on the data provided, will be included in written Master's thesis and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or orally presented, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against an individual who elects to participate in any or all of this survey.

USAF SCN 78-116
Expires 22 September 1978

I. GENERAL INFORMATION

Please circle the number of the appropriate response.

A. What is your age?

1. Less than 25 years
2. 25-29 years
3. 30-34 years
4. 35-39 years
5. 40-44 years
6. 45-49 years
7. 50-54 years
8. 55-59 years
9. 60 or more years

B. What is your sex?

1. Male
2. Female

C. What is your current grade?

1. GS 8 or GS 9
2. GS 10
3. GS 11
4. GS 12
5. GS 13
6. GS 14-16 or PL 313
7. O-1 or O-2
8. O-3
9. O-4
10. O-5
11. O-6
12. Other, Specify:_____

D. How long have you been employed by the Air Force?

1. Less than 5 years
2. 5 years but less than 10
3. 10 years but less than 15
4. 15 years but less than 20
5. 20 years but less than 25
6. 25 years but less than 30
7. 30 years or more

E. How long have you been in your current job? _____years.

F. Which one of the following best describes your current job (or your previous job if you are in an education or training status)?

1. Engineer
2. Technician
3. Scientist
4. Manager
5. Staff person
6. Administrator
7. Professor
8. Minister
9. Other, Specify:_____

G. What is the largest number of person you have ever supervised?_____

H. What is your highest level of formal education?

1. Less than college degree
2. Bachelor's Degree
3. Some graduate work (no degree)
4. Master's Degree
5. Some work beyond Master's Degree (NO doctorate)
6. Doctoral Degree

I. In which discipline did you earn your highest degree?

1. Engineering
2. Management
3. Business or Accounting
4. Arts
5. Sciences
6. Divinity
7. Other, Specify: _____
8. No Degree

J. In how many professional and civic organizations are you a member?_____

K. In how many social organizations are you a member?_____

L. In how many of the organizations in questions J and K above do you hold an office?_____

Survey Page 3

Engineer

M. If you are a military officer, what were your scores on your last 3 OERs?

1. Most recent_____ 2. 2nd most recent_____ 3. 3rd most recent_____

N. Indicate how many of the following you have authored/presented/briefed over the past year.

_____a. Published papers in Professional/Technical Journals.

_____b. Technical Reports.

_____c. Technical Memoranda or Test Data Reports.

_____d. Presentations at Symposia, Meetings of Professional Organizations, and Technical Conferences.

_____e. Hardware/Software specifications, Statements of Work, Requests for Proposals, Test Plans, and Test Reports.

_____f. In-house studies, Technical and/or Managerial Assessments.

_____g. Professional or Technical Committee participation (external to job).

Professor

M. If you are a military officer, what were your scores on your last 3 OERs?

1. Most recent_____ 2. 2nd most recent_____ 3. 3rd most recent_____

N. Indicate how many of the following you have authored/presented/briefed over the past year.

_____a. Published papers in Professional/Technical Journals.

_____b. Technical Reports.

_____c. Presentations at Symposia, Meetings of Professional Organizations, and Technical Conferences.

Students

M. If you are a military officer, what were your scores on your last 3 OERs?

1. Most recent_____ 2. 2nd most recent_____ 3. 3rd most recent_____

N. What is your current academic grade point average (based on a 4 point scale)?_____

O. What was your percentile score on the last scholastic apptitude test (SAT, GRE, GMAT, etc.)?_____

Other

M. If you are a military officer, what were your scores on your last 3 OERs?

1. Most recent_____ 2. 2nd most recent_____ 3. 3rd most recent_____

II. JOB FACTORS

Please circle the appropriate response below.

A. Many jobs involve <u>establishing and maintaining friendly relationships with other persons</u>.

a. How often does your present job involve this activity?

1	2	3	4	5	6	7	8	9
RARELY				FAIRLY OFTEN				VERY OFTEN

b. How often do you wish your present job involved this activity?

1	2	3	4	5	6	7	8	9
RARELY				FAIRLY OFTEN				VERY OFTEN

c. How important is it to you to have this activity in your job?

1	2	3	4	5	6	7	8	9
FAIRLY IMPORTANT				VERY IMPORTANT				EXTREMELY IMPORTANT

B. Many jobs involve <u>influencing the activities and thoughts of a number of individuals</u>.

a. How often does your present job involve this activity?

1	2	3	4	5	6	7	8	9
RARELY				FAIRLY OFTEN				VERY OFTEN

b. How often do you wish your present job involved this activity?

1	2	3	4	5	6	7	8	9
RARELY				FAIRLY OFTEN				VERY OFTEN

c. How important is it to you to have this activity in your job?

1	2	3	4	5	6	7	8	9
FAIRLY IMPORTANT				VERY IMPORTANT				EXTREMELY IMPORTANT

C. Many jobs involve <u>accomplishing difficult (but feasible) goals and later receiving detailed information about one's personal performance</u>.

a. How often does your present job involve this activity?

1	2	3	4	5	6	7	8	9
RARELY				FAIRLY OFTEN				VERY OFTEN

b. How often do you wish your present job involved this activity?

1	2	3	4	5	6	7	8	9
RARELY				FAIRLY OFTEN				VERY OFTEN

c. How important is it to you to have this activity in your job?

1	2	3	4	5	6	7	8	9
FAIRLY IMPORTANT				VERY IMPORTANT				EXTREMELY IMPORTANT

D. If a problem comes up in your work and it is not all settled by the time you go home from work, how likely is it that you will find yourself thinking about it after work?

1. I'm sure I won't think about it.
2. I probably won't think about it.
3. I very seldom will think about it.
4. Every once in a while I will think about it.
5. There is a pretty good chance I will think about it.
6. Most of the time I will think about it.
7. I will always think about it.

E. Which one of the following shows how much of the time you feel satisfied with your job?

1. Never
2. Seldom
3. Occasionally
4. About half of the time
5. A good deal of the time
6. Most of the time
7. All of the time

F. Choose the one of the following statements which best tells how well you like your job.

1. I hate it
2. I dislike it
3. I do not like it.
4. I am indifferent to it
5. I like it
6. I am enthusiastic about it
7. I love it

G. Which one of the following best tells how you feel about changing your job?

1. I would quit this job at once if I could.
2. I would take almost any other job in which I could earn as much as I am earning now.
3. I would like to change both my job and my occupation.
4. I would like to exchange my present job for another one.
5. I am not eager to change my job, but I would do so if I could get a better job.
6. I cannot think of any jobs for which I would exchange.
7. I would not exchange my job for any other.

H. Which one of the following shows how you think you compare with other people?

1. No one dislikes his job more than I dislike mine.
2. I dislike my job much more than most people dislike theirs.
3. I dislike my job more than most people dislike theirs.
4. I like my job about as well as most people like theirs.
5. I like my job better than most people like theirs.
6. I like my job much better than most people like theirs.
7. No one likes his job better than I like mine.

III. DECISION-MAKING EXERCISE INSTRUCTIONS

This section consists of a decision making exercise. During the exercise, you should assume that you are being transferred or changing jobs. A number of new jobs are available to you. Each of these jobs offers the same general benefits such as salary, geographical location, and so forth, and you should assume these jobs do not differ in these areas. The only real differences in these jobs relate to the frequency with which three key activities are involved with each of these jobs. These activities are involved either RARELY, FAIRLY OFTEN, or VERY OFTEN. A sample job is shown below.

JOB #0

This job involves--

--establishing and maintaining friendly relationships with other persons . . . . . (specific information
--influencing the activities or thoughts of a number of individuals . . . . . about the frequency with which these activities
--accomplishing difficult (but feasible) goals and later receiving detailed information about your personal performance. . . . . are involved will be presented here)

If all other factors were the same, about what chance is there you would seek this job?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
DEFINITELY NOT										DEFINITELY YES

You should circle the number that best indicates the chance you would seek this particular job. Make each decision one at a time and independently of the others. Do not change a decision once you have made it. Work at a brisk pace, but don't hurry your decisions. Complete EVERY case, as each case is DIFFERENT.

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JOB #1

This job involves--

--establishing and maintaining friendly relationships with other persons . . . . . .FAIRLY OFTEN
--influencing the activities or thoughts of a number of individuals. . . . . .RARELY
--accomplishing difficult (but feasible goals and later receiving detailed information about your personal performance. . . . . .VERY OFTEN

If all other factors (pay, location, etc.) were the same, about what chance is there you would seek this job?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
DEFINITELY NOT										DEFINITELY YES

- - - - - - - - - - - -

JOB #2

This job involves--

--establishing and maintaining friendly relationships with other persons . . . . . .VERY OFTEN
--influencing the activities or thoughts of a number of individuals. . . . . .RARELY
--accomplishing difficult (but feasible) goals and later receiving detailed information about your personal performance. . . . . .FAIRLY OFTEN

If all other factors (pay, location, etc.) were the same, about what chance is there you would seek this job?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
DEFINITELY NOT										DEFINITELY YES

- - - - - - - - - - - -

JOB #3

This job involves--

--establishing and maintaining friendly relationships with other persons . . . . . .RARELY
--influencing the activities or thoughts of a number of individuals. . . . . .VERY OFTEN
--accomplishing difficult (but feasible) goals and later receiving detailed information. . . . .VERY OFTEN
about your personal performance

If all other factors (pay, location, etc.) were the same, about what chance is there you would seek this job?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
DEFINITELY NOT										DEFINITELY YES

JOB #24

This job involves--

--establishing and maintaining friendly relationships with other persons . . . . . .FAIRLY OFTEN

--influencing the activities or thoughts of a number of individuals. . . . . .VERY OFTEN

--accomplishing difficult (but feasible) goals and later receiving detailed information about your personal performance. . . . . .RARELY

If all other factors (pay, location, etc.) were the same, about what chance is there you would seek this job?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
DEFINITELY NOT										DEFINITELY YES

- - - - - - - - - - - -

JOB #25

This job involves--

--establishing and maintaining friendly relationships with other persons . . . . . .FAIRLY OFTEN

--influencing the activities or thoughts of a number of individuals. . . . . .RARELY

--accomplishing difficult (but feasible) goals and later receiving detailed information about your personal performance. . . . . .RARELY

If all other factors (pay, location, etc.) were the same, about what chance is there you would seek this job?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
DEFINITELY NOT										DEFINITELY YES

- - - - - - - - - - - -

JOB #26

This job involves--

--establishing and maintaining friendly relationships with other persons . . . . . .RARELY

--influencing the activities or thoughts of a number of individuals. . . . . .FAIRLY OFTEN

--accomplishing difficult (but feasible) goals and later receiving detailed information about your personal performance. . . . . .RARELY

If all other factors (pay, location, etc.) were the same, about what chance is there you would seek this job?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
DEFINITELY NOT										DEFINITELY YES

- - - - - - - - - - - -

JOB #27

This job involves--

--establishing and maintaining friendly relationships with other persons . . . . . .VERY OFTEN

--influencing the activities or thoughts of a number of individuals. . . . . .FAIRLY OFTEN

--accomplishing difficult (but feasible) goals and later receiving detailed information about your personal performance. . . . . .FAIRLY OFTEN

If all other factors (pay, location, etc.) were the same, about what chance is there you would seek this job?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
DEFINITELY NOT										DEFINITELY YES

- - - - - - - - - - - -

Indicate the relative importance you feel you place upon each of the three activities shown below in choosing a new job by distributing 100 points among these activities. The most importance activity should receive the most points and so forth.

a. Establishing and maintaining friendly relationships with other persons . . . . . _____

b. influencing the activities or thoughts of a number of individuals. . . . . _____

c. accomplishing difficult (but feasible) goals and later receiving detailed information about one's personal performance. . . . . _____

TOTAL POINTS 100

YOUR COOPERATION HAS BEEN APPRECIATED. If you wish information on how your responses compare with those of your contemporaries, please write your name and address in the space below.

NAME ADDRESS CITY STATE ZIP

APPENDIX B

Data Formats

This appendix includes the list of variables measured in the survey, the card formats of the data for input into the regression analysis and the card formats of the permanent output data.

TABLE VII

Variables and Card Format for Input to Regression Program

Variable Name	Symbol	Format	Col	Ques #
Sequence=1				
Age	IBUF(1)	I5	1	I-A
Sex	IBUF(1)	-	2	I-B
Current Grade	IBUF(1)	-	3	I-C
Length of AF Employ	IBUF(1)	-	5	I-D
Time in Job	IBUF(2)	I2	6	I-E
Current Vocation (1)	IBUF(3)	I6	8	I-F
# Persons Supv'sd	IBUF(3)	-	9	I-G
Highest Education Lev	IBUF(3)	-	12	I-H
Highest Education Disc	IBUF(3)	-	13	I-I
Prof/Civic Org Mbrshp	IBUF(4)	1x,I1	14	I-J
Soc Org Mbrshp	IBUF(5)	1x,I1	16	I-K
Org Offices Held	IBUF(6)	1x,I1	18	I-L
OER, Most Recent	IBUF(7)	I1	20	I-M
OER, 2nd Most Recent	IBUF(8)	I1	21	I-M
OER, 3rd Most Recent	IBUF(9)	I1	22	I-M
Performance Indicators(2)	IBUF(10-16)	7I2	23	I-N
Porter Job Att Ques's	IBUF(17-19)	3I5	37	II-A,B,C
Intrinsic Job Involv	IBUF(17-19)	-	46	II-D
Hoppock JSAT Ques	IBUF(17-19)	-	47	II-E,F,G,H
Feedback Option	IBUF(17-19)	-	51	
Survey Group ID # (3)	IGRP1	I2	73	
Individual ID #	ID1	I3	75	
Sequence #	ISEQ1	I3	78	

TABLE VII (CONT'D)

Variable Name	Symbol	Format	Col
Sequence = 2			
Decision Responses	IYMATRX	27I2	1
Subjective Weights	ISUBJS	3I3	55
Survey Group ID #	IGRP2	I2	73
Individual ID #	ID2	I3	75
Sequence #	ISEQ2	I3	78

Notes: (1) This response was modified for the Chaplain subsample. Responses of 8, 9, or 10 should be recoded to 8 for this data; (2) Different versions of performance measures were used depending upon subsample. For AFAL all seven double-blocks were used and for Professors only the first three double blocks were used. For students, first double-block is two digit GPA with decimal missing and second block is percentile GRE/GMAT. See instrument for details of measures; (3) Codes are: 1 - GSM-78S students, 2 - AF Chaplains School, 3 - AFAL, 4 - GSM-79S/GOR-79D students, 5 - Systems and Logistics students, 6 - Remaining School of Engineering students, 7 - Professors.

TABLE VIII

Variables and Card Format Output from Regression Program

Variable Name	Symbol	Format	Col
Sequence = 1			
Age	AGE	I1	1
Sex	SEX	I1	2
Current Grade	GRD	I2	3
Length of AF Employ	TIS	I1	5
Time in Job	TIJ	I2	6
Current Vocation (1)	VOC	I1	8
# Persons Supv'sd	SUPV	I3	9
Highest Education Lev	EDL	I1	12
Highest Education Disc	EDD	I1	13
Prof/Civic Org Mbrshp	01	I1	14
Soc Org Mbrshp	02	I1	15
Org Offices Held	03	I1	16
Avg Composite OER	OER	F4.2	17
Performance Indicators	PERF1 to PERF7	7I2	21
Porter Job Att Ques	PTR1 to PTR9	9I1	35
Intrinsic Job Involv	EI	I1	44
Hoppock JSAT Ques	SAT1 to SAT4	4I1	45
Feedback Option	FB	I1	49
Survey Group ID # (3)	IGRP	I2	73
Individual ID #	ID	I3	75
Sequence #	SEQ		

TABLE VIII (CONT'D)

Variable Name	Symbol	Format	Col
Sequence = 2			
Decision Responses	IYMATRX	27I2	1
Mean of Responses	YAUG	F6.2	55
Std Dev of Responses	STDDY	F9.3	61
Survey Group ID #	IGRP	I2	73
Individual ID #	ID	I3	75
Sequence #	SEQ	I1	80
Sequence = 3			
Beta Weights (Simple(4))	N1 to N3 (BSTDZD)	3F5.3	1
Relative Weights (4)	RW1 to RW3 (RELWTS)	3F3.0	16
Subjective Weights (4)	SW1 to SW3 (ISUBJS)	3I3	25
Simple Liner R Sqd	R2M (RSQ)	F4.3	34
Int'act R Sqd	R2I (RSQD)	F4.3	38
Regression Sum of Sq's	SSY	F10.3	42
Sum of Dec Resp (5)	SUMY	F8.0	52
Sum of Sqd Dec Resp (5)	SUMY2	F8.0	60
Survey Froup ID #	IGRP	I3	73
Individual ID #	ID	I3	75
Sequence #	DEQ	I1	80

TABLE VIII (CONT'D)

Variable Name	Symbol	Format	Col
Sequence = 4			
Int'act Beta Weights (6)	N4 to N7	4F5.3	1
Significance Levels (7)	ALPHA1 to ALPHA10	10F4.3	21
Survey Group ID #	IGRP	I2	73
Individual ID #	ID	I3	75
Sequence #	SEQ	I1	80

Notes: In Symbol Col, name in parenthesis is name used in FORTRAN pgm. All other names used in SPSS pgm; (1)-(3) see notes Table VII; (4) order of variables - N AFF, N POW, N ACH; (5) the usefulness of these variables is that if the data is partioned, these var's can be summed across the partition to assist in calculating std dev for the partition; (6) order of vars is AFF * POW, AFF * ACH, POW * ACH, AFF * POW * ACH; (7) order of variables - AFF, POW, ACH, R2M, AFF * POW, AFF * ACH, POW * ACH, AFF * POW * ACH, R2I, R2I vs R2M.

APPENDIX C

Procedures and Derivations of Experimental Design

This appendix explains the theoretical and methodological bases for designing the decision making exercise, for coding the dependent and independent variables for regression, and for deriving the standardized beta weights and relative weights.

Procedures and Derivations of Experimental Design

1. The variables of interest in this experiment are need for achievement, need for affiliation, and need for power. The descriptors used as informational cues in the exercise are:

> Achievement - accomplishing difficult (but feasible) goals and later receiving detailed information about your personal performance.
>
> Affiliation - establishing and maintaining friendly relationships with other persons.
>
> Power - influencing the activities or thoughts of a number of individuals.

2. Each variable takes on three possible values. The values are ordinal in scale and generally descriptive of the range of possible values for the cues. Specifically the values are -

RARELY, FAIRLY OFTEN, VERY OFTEN

The decision or criterion variables are likelihood estimates from 0% to 100% in 10% increments that the individual would choose hypothetical jobs involving the three and only the three cues of interest.

3. It is essential to this research that the predictor cues be orthogonal in order to detect the independent contribution of each cue to the individual's decision as well as for reasons of mathematical parsimony (Darlington, 1968; James, et al., 1975:Ch 3 and 4). Since there are three cues with three values each, a full factorial design, which insures orthogonality of the predictor variables, requires 27 hypothetical jobs to represent all possible cue-value combinations. The sequence

of predictors was randomized for the first job and this sequence was used for each subsequent job. The sequence is

AFFILIATION, POWER, ACHIEVEMENT

The sequence of cue-value combinations is:

JOB #	AFFILIATION	POWER	ACHIEVEMENT
1	FAIRLY OFTEN	RARELY	VERY OFTEN
2	VERY OFTEN	RARELY	FAIRLY OFTEN
3	RARELY	VERY OFTEN	VERY OFTEN
4	FAIRLY OFTEN	FAIRLY OFTEN	VERY OFTEN
5	RARELY	VERY OFTEN	FAIRLY OFTEN
6	RARELY	RARELY	RARELY
7	RARELY	FAIRLY OFTEN	VERY OFTEN
8	VERY OFTEN	FAIRLY OFTEN	VERY OFTEN
9	VERY OFTEN	VERY OFTEN	FAIRLY OFTEN
10	RARELY	RARELY	FAIRLY OFTEN
11	RARELY	FAIRLY OFTEN	FAIRLY OFTEN
12	RARELY	RARELY	VERY OFTEN
13	FAIRLY OFTEN	VERY OFTEN	FAIRLY OFTEN
14	FAIRLY OFTEN	FAIRLY OFTEN	FAIRLY OFTEN
15	FAIRLY OFTEN	VERY OFTEN	VERY OFTEN
16	VERY OFTEN	RARELY	RARELY
17	FAIRLY OFTEN	RARELY	FAIRLY OFTEN
18	FAIRLY OFTEN	FAIRLY OFTEN	RARELY
19	VERY OFTEN	VERY OFTEN	VERY OFTEN
20	VERY OFTEN	RARELY	VERY OFTEN
21	VERY OFTEN	VERY OFTEN	RARELY
22	VERY OFTEN	FAIRLY OFTEN	RARELY
23	RARELY	VERY OFTEN	RARELY
24	FAIRLY OFTEN	VERY OFTEN	RARELY
25	FAIRLY OFTEN	RARELY	RARELY
26	RARELY	FAIRLY OFTEN	RARELY
27	VERY OFTEN	FAIRLY OFTEN	FAIRLY OFTEN

4. The basis for calculating the beta weights of the individual's decision policy is based on the matrix equation (James, et al., 1975:130),

$$(1) \quad \underline{b} = (\underline{X}^{*\prime} X^*)^{-1} \underline{X}^{*\prime} Y^*$$

where

$\underline{b}$ is the column vector of standardized regression coefficients or beta weights

$\underline{X}^*$ is the matrix of standardized predictor variables ($\underline{X}$)

Y^* is the column vector of standardized criterion variables ($\underline{Y}$)

To standardize $\underline{X}$ and $\underline{Y}$, the mean of each column in the matrix and column vector is calculated and subtracted from each element in the respective column.

$$(2) \quad D_X = \underline{X} - \underline{M}_X \qquad D_y = \underline{Y} - \underline{M}_y$$

The resulting matrix and column vectors are transposed and multiplied by themselves. These matrices are divided by (n-1) to generate the covariance matrixes (S_y and S_x), where n is the number of cases or jobs used in the regression (in this research n = 27). Each element in the difference matrix and column vector (D_X and D_y) are divided by the square roots of the diagonals (variances) of the covariance matrices. If the predictors are orthogonal, all off diagonal elements will be zero.

$$(3) \quad S_X = \frac{D_X{}'D_X}{n-1} \qquad S_y = \frac{D_y{}'D_y}{n-1}$$

$$(4) \quad \underline{X}^* = D_X/\sqrt{S_{x_i}} \qquad \underline{Y}^* = D_y/\sqrt{S_{y_i}}$$

5. To simplify the actual calculations performed on the data a special coding scheme for the predictor variables is employed The cue levels must be represented numerically although no absolute anchored scale is infered by the level descriptors. However, the least squares regression is fairly insensitive to the scale used as long as the scale is interval. A simple coding scheme which causes each cue mean to be zero is

Rarely = -1
Fairly Often = 0
Very Often = 1

6. Interactions of variables are included in this analysis. To derive the beta weights for the interactions the standardized

X matrix must be transformed. The transformation consists of multiplying column 1 (affiliation) with column 2 (power) and treating the product as column 4 of the matrix. The process is continued - column 1 with column 3 into column 5, column 2 with column 3 into column 6, column 1 with column 2 with column 3 into column 7. The standardized X matrix now has seven columns representing simple and interactive cues.

7. At this point the $(\underline{X}^{*\prime}\underline{X}^{*})^{-1}X^{*\prime}$ is calculated using FORTRAN matrix transposition, matrix inversion, and matrix multiplication subroutines in the AFIT library. Actual numeric calculations are shown in Table IX. The resulting matrix is multiplied with the standardized Y matrix to calculate the beta weights for each informational cue including interactions (7 beta weights in all).

8. Calculation of R^2 is based upon the sum of the betas squared. The rationale for calculating R^2 in this manner is based on the following:

$$(5) \quad R^2 = b_1 r_1 + b_2 r_2 + \ldots b_n r_n$$

where

r_i is the simple correlation coefficient between the i'th predictor variable and criterion variable

b_i is the beta weight for the i'th predictor variable (Darlington, 1968:169).

If the predictor variables are orthogonal (that is, uncorrelated) then -

$$(6) \quad r_i = B_i \, (S_y / S_{x_i})$$

where

B_i is unstandardized coefficient of regression for the i'th cue

S_{x_i} is standard deviation of i'th cue, and

S_y is standard deviation of predictor variable (Darlington, 1968:162)

and

(7) $b_i = B_i (S_y/S_{x_i})$
(by definition, Nie, et al., 1970:329)

Therefore if predictor variables are orthogonal, R^2 reduces to -

(8) $R^2 = b_1^2 + b_2^2 + \ldots b_n^2$

9. The calculation of relative weights is -

(9) $RW_i = b_i r_i / R^2$
(Hoffman, 1960:120-121)

but since the predictors are orthogonal the relative weights reduces to -

(10) $RW_i = b_i^2 / R^2$

Only the relative weights for the main cues have any real meaning in the context of this research.

10. Several F-Ratios to test significance of the betas and R^2 are of interest. They are -

Simple model, betas

(11) $F_o = (b_i^2/1)/((1-R^2)/(n-k-1))$

where

n is number of decisions or criterion variables
n = 27

where

k is number of predictor variables
k = 3

Simple model, R^2

(12) $F_o = (R^2/k)/((1-R^2)/(n-k-1))$

n = 27

k = 3

Interactive model, beta

(13) $F_o = (b_i^2/1)/((1-R^2)/(n-k-1))$

$n = 27$

$k = 7$

Interactive model, R^2

(14) $F_o = (R^2/k)/((1-R^2)/(n-k-1))$

$n = 27$

$k = 7$

Interactive versus Simple model

(15) $F_o = ((R_I^2 - R_S^2)/(k_I - k_S))/((1-R^2)/(n - k_I - 1))$

$n = 27$

$k_I = 7$
$k_S = 3$

Table X shows the actual F ratios and degrees of freedom at various levels of significance.

11. A Word on Orthogonality. Orthogonality as used in this appendix refers only to the manner in which the cues are presented in the decision exercise. By presenting every possible combination of the cue levels the information across cues is uncorrelated. This is not to say that the individual decision maker uses the cues independently, or that the factors that the cues represent are uncorrelated in nature. In fact by being orthogonal in the predictors such interactions in the decision process can be detected.

TABLE IX

Derivation of Decision Matrices for Computing Beta Weights

Design Matrix - X

k	Affiliation	Power	Achievement
1	0	-1	1
2	1	-1	0
3	-1	1	1
4	0	0	1
5	-1	1	0
6	-1	-1	-1
7	-1	0	1
8	1	0	1
9	1	1	0
10	-1	-1	0
11	-1	0	0
12	-1	-1	1
13	0	1	0
14	0	0	0
15	0	1	1
16	1	-1	-1
17	0	-1	0
18	0	0	-1
19	1	1	1
20	1	-1	1
21	1	1	-1
22	1	0	-1
23	-1	1	-1
24	0	1	-1
25	0	-1	-1
26	-1	0	-1
27	1	0	0
Mean	0	0	0

Covariance Matrix

	Affiliation	Power	Achievement
Affiliation	.6923	.0000	.0000
Power	.0000	.6923	.0000
Achievement	.0000	.0000	.6923

TABLE IX (Cont'd)

$(X^{*\prime} X^{*})^{-1} X^{*\prime}$ Matrix

k	Aff	Pow	Ach	Aff*Pow	Aff*Ach	Pow*Ach	Aff*Pow*Ach
1	.0000	-.0462	.0462	.0000	.0000	-.0577	.0000
2	.0462	-.0462	.0000	-.0577	.0000	.0000	.0000
3	-.0462	.0462	.0462	-.0577	-.0577	.0577	-.0720
4	.0000	.0000	.0462	.0000	.0000	.0000	.0000
5	-.0462	.0462	.0000	-.0577	.0000	.0000	.0000
6	-.0462	-.0462	-.0462	.0577	.0577	.0577	-.0720
7	-.0462	.0000	.0462	.0000	-.0577	.0000	.0000
8	.0462	.0000	.0462	.0000	.0577	.0000	.0000
9	.0462	.0462	.0000	.0577	.0000	.0000	.0000
10	-.0462	-.0462	.0000	.0577	.0000	.0000	.0000
11	-.0462	.0000	.0000	.0000	.0000	.0000	.0000
12	-.0462	-.0462	.0462	.0577	-.0577	-.0577	.0720
13	.0000	.0462	.0000	.0000	.0000	.0000	.0000
14	.0000	.0000	.0000	.0000	.0000	.0000	.0000
15	.0000	.0462	.0462	.0000	.0000	.0577	.0000
16	.0462	-.0462	-.0462	-.0577	-.0577	.0577	.0720
17	.0000	-.0462	.0000	.0000	.0000	.0000	.0000
18	.0000	.0000	-.0462	.0000	.0000	.0000	.0000
19	.0462	.0462	.0462	.0577	.0577	.0577	.0720
20	.0462	-.0462	.0462	-.0577	.0577	-.0577	-.0720
21	.0462	.0462	-.0462	.0577	-.0577	-.0577	-.0720
22	.0462	.0000	-.0462	.0000	-.0577	.0000	.0000
23	-.0462	.0462	-.0462	-.0577	.0577	-.0577	.0720
24	.0000	.0462	-.0462	.0000	.0000	-.0577	.0000
25	.0000	-.0462	-.0462	.0000	.0000	.0577	.0000
26	-.0462	.0000	-.0462	.0000	.0577	.0000	.0000
27	.0462	.0000	.0000	.0000	.0000	.0000	.0000

TABLE X

Selected F Ratios for Regression Variables

Variable	df 1	df 2	F p=.05	F p=.01	F p=.001
b_i	1	23	4.28	7.88	14.19
R_s^2	3	23	3.03	4.76	7.67
b_i	1	19	4.38	8.18	15.08
R_I^2	7	19	2.54	3.77	5.85
$R_I^2 : R_S^2$	3	19	3.13	5.01	8.28

APPENDIX D

FORTRAN Regression Analysis Program

A complete copy of the regression analysis program used to generate the beta weights, relative weights and F ratio statistics from the decision exercise responses is included in this appendix.

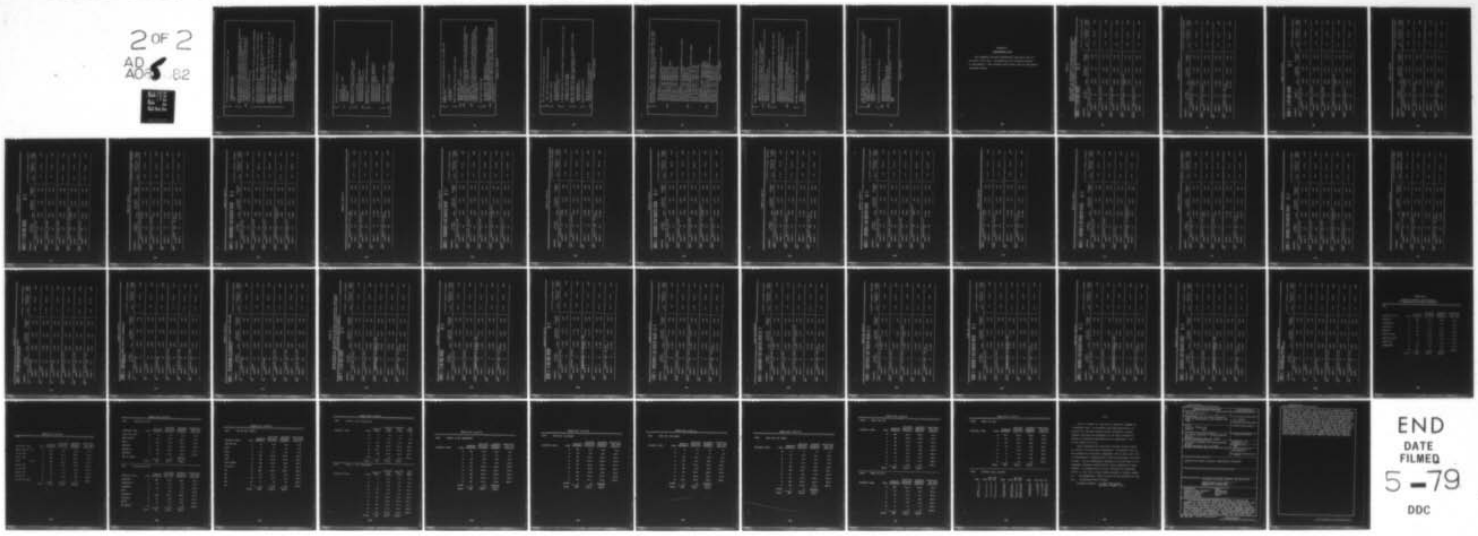
```
      PROGRAM FFANAL (INPUT,OUTPUT,TAPE1,TAPE2,TAPE6=OUTPUT)
      DIMENSION QMATRX(7,27),YMATRX(27,1),IYMATRX(27),IBUF(13)
      DIMENSION ISUBJS(3),BETA(7),BSTDZD(7,1),RELWT(3),VARK(3)
      INTEGER SIGPR,SIG
      DIMENSION F(10),ALPHA(10),SIG(4),SIGPR(9),GPRW(3)
      DATA SIG/3H   ,3H  *,3H **,3H***/
C
C   THE METHOD OF CALCULATING COEFFICIENTS OF REGRESSION IS
C   BASED ON B=QY, WHERE B=VECTOR OF STANDARDIZED REGR COEFF,
C   Y=VECTOR OF STD CRITERION VARIABLES, AND Q IS STANDARDIZED DECISION
C   MATRIX. Q=(Z'Z) INV * Z', WHERE Z IS THE STD MATRIX OF PREDICTOR
C   VARIABLES. Q IS GENERATED EXTERNAL TO THIS PROGRAM AND IS READ IN
C   AS PART OF THE INPUT DECK.
C
C   SET INITIAL CONDITIONS FOR PROGRAM
C   NOCUES=NUMBER OF DECISION CUES IN DESIGN. IN THIS PROGRAM INTER-
C   ACTION  OF CUES ARE ALSO ANALYZED. THE VECTORS FOR THESE INTER-
C   ACTIONS ARE INCLUDED IN THE Q MATRIX AND NOCUES.
C   NOQUES=NUMBER OF QUESTIONS
C
      NOCUES=7
      NOQUES=27
      SCALE=10.
      NOCASE=0
      YMEAN=YSD=GPMR2=GPTMR2=0.
      REWIND 1
      REWIND 2
C
C   READ IN Q MATRIX: DIMENSION IS NOCUES BY NOQUES
C
      DO 10 J=1,NOQUES
10    READ 1000, (QMATRX(I,J),I=1,NOCUES)
1000  FORMAT(7F9.5)
```

Figure 17. FORTRAN Program for Full-Factorial Regression Analysis of Decision -Making Exercises

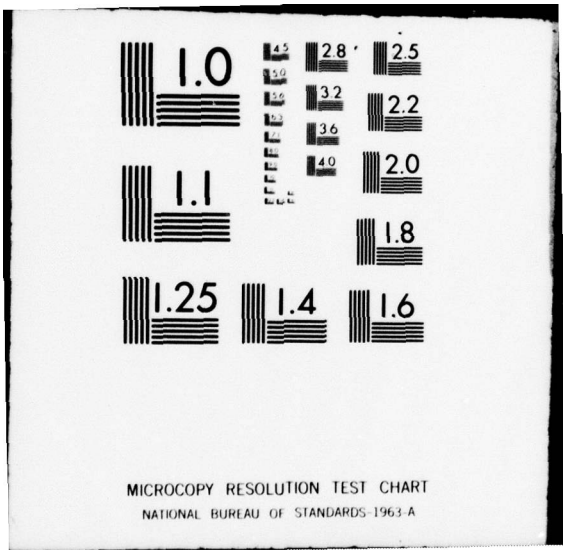
AD-A065 882 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCH--ETC F/G 5/10
POLICY-CAPTURING AND WORK MOTIVATION. NEED FOR ACHIEVEMENT, AFF--ETC(U)
SEP 78 B G THOMAS

UNCLASSIFIED AFIT/GSM/SM/78S-22 NL

2 OF 2
AD
A065 882



END
DATE FILMED
5-79
DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
C
C   SET INITIAL CONDITIONS FOR EACH INDIVIDUAL CASE
C
5     SUMY=SUMY2=RSQD=DER=0.
      ICODE1=ICODE2=ICODE3=0
      N=0
C
C   READ IN DEMOGRAPHICS(IBUF), DECISION RESPONSES(IYMATRX), SUBJECTIVE
C   WEIGHTS(ISUBJS), POPULATION ID(IGRP), AND INDIVIDUAL ID(ID)
      READ(1,1001) (IBUF(I),I=1,19),IGRP1,ID1,ISEQ1,
     1(IYMATRX(I),I=1,NOQUES),(ISUBJS(I),I=1,3),IGRP2,ID2,ISEQ2
1001  FORMAT(I5,I2,I6,1X,I1,1X,I1,1X,I1,3I1,7I2,3I5,T73,I2,2I3/
     127I2,3I3,T73,I2,2I3)
      IF(EOF(1) .NE. 0) GO TO 999
C
C   ITERATE NUMBER OF CASES(NOCASE) IN SAMPLE AND COMPUTE DIAGNOSTICS.
C
C    ICODE1=1 MEANS THE POP ID CODES ON THE FIRST & SECOND CARDS OF
C   CASE  DO NOT COINCIDE
C    ICODE1=2 MEANS THE POP ID CODES FOR THIS CASE DO NOT  COINCIDE
C   WITH POP ID CODE OF PREVIOUS CASE IN RECORD
C    ICODE1=3 MEANS BOTH OF THE ABOVE
C
C    ICODE2=1 MEANS INDIVIDUAL ID CODES ON TWO CARDS IN CASE DO  NOT
C   COINCIDE
C    ICODE2=2 MEANS THIS CASE INDIVIDUAL ID CODE IS NOT SEQUENT-
C   IAL WITH PREVIOUS CASE
C    ICODE2=3 MEANS BOTH OF ABOVE
C
C    ICODE3=1 MEANS SEQUENCE NUMBERS FOR TWO CARDS IN CASE ARE
C   MISSING OR INCORRECT
C
      NOCASE=NOCASE+1
      IF(IGRP1.NE.IGRP2) ICODE1=1
      IF(ID1.NE.ID2) ICODE2=1
      IF(ID1.NE.(JID+1).AND.ID1.NE.NOCASE) ICODE2=ICODE2+2
      IF(ISEQ1.NE.1.AND.ISEQ2.NE.2) ICODE3=1
```

Figure 17 (Cont'd)

```
C
C    CALCULATE AVERAGE OER SCORE
C
       DO 15 I=7,9
       IF(IBUF(I).GT.0) N=N+1
15     OER=OER+IBUF(I)
       IF(N.LE.1) N=1
       OER=OER/N
C
C    CALCULATE STATISTICS TO STD'IZE Y MATRIX
C    SUMY=SUM OF Y, SUMY2=SUM OF Y SQUARED
C
16     DO 20 I=1,NOQUES
       YMATRX(I,1)= IYMATRX(I)*SCALE
       SUMY=SUMY+(YMATRX(I,1))
20     SUMY2=SUMY2+(YMATRX(I,1))**2
C
C    VARY=VARANCE OF Y, STDDY=STANDARD DEVIATION OF Y,
C    YAVG=THE MEAN OF Y.
C
       VARY=SUMY2/NOQUES-SUMY**2/NOQUES**2
       STDDY=SQRT(VARY*NOQUES/(NOQUES-1))
       IF(STDDY.EQ.0.)GO TO 60
       SSY=(NOQUES-1)*VARY
       YAVG=SUMY/NOQUES
C
C    CALCULATE THE STANDARDIZED Y MATRIX
C
       DO 25 I=1,NOQUES
25     YMATRX(I,1)=(YMATRX(I,1)-YAVG)/STDDY
```

Figure 17 (Cont'd)

```
C
C    BYPASS THE FOLLOWING CALCULATIONS AFTER THE FIRST PASS
C    THROUGH DATA
C
       IF(NOCASE.NE.1) GO TO 38
       JGRP=IGRP1
C
C    PRINT THE HEADINGS FOR THE PRINTER OUTPUT
C
       WRITE(6,1005) IGRP1
1005   FORMAT(1H1,*SAMPLE = *,2X,I3)
       WRITE (6,1006)
1006   FORMAT(1H0,T2,*ID*,T10,*AVG*,T17,*STD DEV*,T34,*BETA WEIGHTS*,T53,
      1*MAIN*,T65,*INTERACT BETA WEIGHTS*,T92,*TOTAL*,T98,*INT/LIN*,
      1T110,*RELWT*,T12?,*SUBJ WT*)
       WRITE(6,1007)
1007   FORMAT(1H ,T11,*Y*,T20,*Y*,T31,*AFF*,T38,*POW*,T45,*ACH*,T53,
      1*RSQD*,T61,*AF-POW*,T68,*AF-ACH*,T75,*P-ACH*,T81,*AF-P-ACH*,T92,
      1*RSQD*,T100,*SIG*,T106,*AFF*,T111,*POW*,T116,*ACH*,T122,*AFF*,T126
      1,*POW*,T130,*ACH*)
C
C    PRINT CASE DIAGNOSTICS
C
38     IF(IGRP1.NE.JGRP) ICODE1=ICODE1+2
       IF(ICODE1.EQ.0.AND.ICODE2.EQ.0.AND.ICODE3.EQ.0) GO TO 39
       WRITE(6,1010) ID1,ICODE1,ICODE2,ICODE3,IGRP1,IGRP2,ID2,ISEQ1,ISEQ2
1010   FORMAT(1H0,*CHECK DATA FILE,AT ID1=*,I3,* CODES ARE ICODE1,ICODE2,
      1 AND ICODE3,RESP:*3I3,* CARD FIELDS IGRP1,IGRP2,ID2,ISEQ1,AND ISE
      1Q2, RESP:*,5I3)
```

Figure 17 (Cont'd)

```
C
C   CALL THE MATRIX MULTIPLY SUBROUTINE: B=QY
C
39    CALL MMPY (QMATRX,YMATRX,BSTDZD,NOCJES,NOQUES,1)
C
C   CALCULATE R SQUARED
C
      DO 40 I=1,NOQUES
      RSQD=RSQD+BSTDZD(I,1)**2
40    IF(I.EQ.3) RSQ=RSQD
C
C   R SQUARED ADJUSTED TO PREVENT POSSIBLE DIVISION BY ZERO LATER IN PGM
C
      IF(RSQ.EQ.1.)RSQ=.99999
      IF(RSQD.EQ.1.)RSQ=.99999
C
C   GPMR2 AND GPTMR2 ARE USED TO ACCUMULATE INDIVIDUAL R SQ ACROSS
C   SAMPLE TO LATER CALCULATE SAMPLE AVERAGE R SQ
C
      GPMR2=GPMR2+RSQ
      GPTMR2=GPTMR2+RSQD
C
C   RELWT=THE REL WEIGHTS
C
      DO 45 I=1,3
      RELWT(I)=(BSTDZD(I,1)**2/RSQ)*100.
45    IF(RELWT.EQ.100.) RELWT=99.
```

Figure 17 (Cont'd)

```
C
C   CALCULATE LEVELS OF SIGNIFICANCE FOR BETA WEIGHTS AND R SQ BASED
C   ON F RATIOS. ALPHA =TESTED LEVELS OF SIGNIFICANCE (.05,.01,.001)
C   SIGPR= SIGNIFICANCE INDICATOR FOR OUTPUT
C
      DO 100 I=1,3
      F(I)=((BSTDZD(I,1)**2)*(NOQUES-3-1))/1.*(1.-RSQ)
      IF(F(I).LT. 4.28) ALPHA(I)=.999
      IF(F(I).GE. 4.28) ALPHA(I)=.05
      IF(F(I).GE. 7.88) ALPHA(I)=.01
100   IF(F(I).GE.14.19) ALPHA(I)=.001
      F(4)=((NOQUES-3-1)*RSQ)/(3.*(1.-RSQ))
      IF(F(4).LT. 3.03) ALPHA(4)=.999
      IF(F(4).GE. 3.03) ALPHA(4)=.05
      IF(F(4).GE. 4.76) ALPHA(4)=.01
      IF(F(4).GE. 7.67) ALPHA(4)=.001
      DO 110 I=5,8
      F(I)=((BSTDZD(I-1,1)**2)*(NOQUES-NOCUES-1))/1.*(1.-RSQD)
      IF(F(I).LT. 4.38) ALPHA(I)=.999
      IF(F(I).GE. 4.38) ALPHA(I)=.05
      IF(F(I).GE. 8.18) ALPHA(I)=.01
110   IF(F(I).GE.15.08) ALPHA(I)=.001
      F( 9)=((NOQUES-NOCUES-1)*(RSQD))/(NOCUES*(1.-RSQD))
      IF(F( 9).LT.2.54 ) ALPHA( 9)=.999
      IF(F( 9).GE.2.54 ) ALPHA( 9)=.05
      IF(F( 9).GE.3.77 ) ALPHA( 9)=.01
      IF(F( 9).GE. 5.85) ALPHA( 9)=.001
      DO 120 I=1,9
      IF(ALPHA(I).EQ..999) SIGPR(I)=SIG(1)
      IF(ALPHA(I).EQ..05  ) SIGPR(I)=SIG(2)
      IF(ALPHA(I).EQ..01 ) SIGPR(I)=SIG(3)
120   IF(ALPHA(I).EQ..001) SIGPR(I)=SIG(4)
      F(10)= (RSQD-RSQ)*(NOQUES-NOCUES-1)/(3.*(1.-RSQD))
      IF(F(10).LT. 3.13) ALPHA(10)=.999
      IF(F(10).GE. 3.13) ALPHA(10)=.05
      IF(F(10).GE. 5.01) ALPHA(10)=.01
      IF(F(10).GE. 8.28) ALPHA(10)=.001
```

Figure 17 (Cont'd)

```
C
C   PRINT INDIVIDJAL REGRESSION STATISTICS TO OUTPUT
C
      WRITE(6,1011) ID1,YAVG,STDDY,(BSTDZD(I,1),I=1,3),RSQ,
     1(BSTDZD(I,1),I=4,7),RSQD,ALPHA(1),RELWT,ISUBJS
1011  FORMAT(1H0,I3,3X,F7.2,2X,F7.3,4X,3F7.3,1X,F7.3,3X,4F7.3,2X,F7.3,
     11X,F5.3,1X,3F5.0,2X,3I4)
      WRITE(6,1013)(SIGPR(I),I=1,9)
1013  FORMAT(1H ,T32,3A7,1X,A7,3X,4A7,2X,A7)
C
C   WRITE DEMOGRAPHICS, REGRESSION STATISTICS, SIG LEVELS AND OTHER
C   PARAMETERS TO TAPE (DISK)
C
      WRITE(2,2000) (IBUF(I),I=1,5),DER,(IBUF(I),I=10,19),IGRP1,ID1,
     1(IYMATRX(I),I=1,27),YAVG,STDDY,IGRP1,ID1,
     1(BSTDZD(I,1),I=1,3),RELWT,ISUBJS,RSQ,RSQD,SSY,SUMY,SUMY2,
     1IGRP1,ID1,
     1(BSTDZD(I,1),I=4,7),ALPHA,IGRP1,ID1
2000  FORMAT(I5,I2,I6,3I1,F4.2,7I2,3I5,T73,I2,I3,*  1*/
     127I2,F6.2,F9.3,T73,I2,I3,*  2*/
     13F5.3,3F3.0,3I3,2F4.3,F10.3,2F8.0,T73,I2,I3,*  3*/
     14F5.3,10F4.3,T73,I2,I3,*  4*)
C
C   SEQUENCE INDIVIDUAL ID NUMBER & IGRP AND RETURN TO READ NEXT CASE
C
      JID=ID1
      JGRP=IGRP1
      GO TO 5
```

Figure 17 (Cont'd)

```
C
C    Y NOT STD'IZED AND BETA'S NOT CALCULATED IF STD DEV OF Y IS ZERO.
C    THIS DIAGNOSTIC IS WRITTEN TO OUTPUT AND CASE IS NOT INCLUDED
C    IN  NOCASE COUNT OR WRITTEN TO TAPE FILE
60     WRITE(6,2001)ID1
2001   FORMAT(1H0,T11,'THE STD DEV OF THE CRIT ID 0 IN ID=',I3)
       JID=ID1
       NOCASE=NOCASE-1
       GO TO 5
C
C    CALCULATE AND PRINT GROUP R SQ TO OUTPUT
C
999    GPMR2=GPMR2/NOCASE
       GPTMR2=GPTMR2/NOCASE
       WRITE(6,1012)NOCASE,GPMR2,GPTMR2
1012   FORMAT(1H0,'NUMBER USABLE CASES=',I5,T32,'MEAN MAIN RSQ IS',T52,F
      15.3,T70,'MEAN TOTAL RSQ IS',T92,F5.3)
       STOP
       END
```

Figure 17 (Cont'd)

APPENDIX E

Supplemental Data

This appendix includes supplemental data which was not included in the text. Included are more complete versions of performance - need strength SPSS T-Test runs and demographic frequency tables.

TABLE XI

Group T-tests of Relationship of Engineering Productivity, Performance, and Satisfaction with Need Strength (Beta Weights, Relative Weights , and Adjusted Relative Weights)

GROUP 1 - N ACH BETA WEIGHT GT .5
GROUP 2 - N ACH BETA WEIGHT LE .5

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1 PUBLISHED PAPERS							
GROUP 1	84	.2381	.594	.065	-.40	169.49	.691
GROUP 2	90	.2778	.719	.076			
PERF2 TECHNICAL REPORTS							
GROUP 1	84	.3214	.643	.070	-.98	135.73	.329
GROUP 2	90	.4667	1.238	.130			
PERF3 TECH MEMOS-ENGNRS							
GROUP 1	84	.6667	1.608	.175	-.04	171.26	.966
GROUP 2	90	.6778	1.841	.194			
PERF4 PRESENTATIONS AT SYMPOSIA,ETC							
GROUP 1	84	.5833	1.020	.111	-.93	123.65	.356
GROUP 2	90	.8333	2.333	.246			
PERF5 SPECS,SOWS,REP,TP							
GROUP 1	84	1.7738	2.524	.275	.02	161.47	.984
GROUP 2	90	1.7667	2.083	.220			

TABLE XI (Cont'd)

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF6 STUDIES,TR OF MGT ASSES							
GROUP 1	84	1.5476	3.098	.338	1.02	147.05	.311
GROUP 2	90	1.1333	2.158	.227			
PERF7 PRO OR TECH COMMITTEE							
GROUP 1	84	.4762	1.739	.190	.18	153.76	.855
GROUP 2	90	.4333	1.307	.138			
OER							
GROUP 1	25	2.2464	.908	.182	.02	37.42	.984
GROUP 2	22	2.2423	.482	.103			
HOPP HOPPOCK OVALL JOB SAT							
GROUP 1	84	19.1548	4.055	.442	.63	169.89	.533
GROUP 2	90	18.7778	3.888	.410			

TABLE XI (Cont'd)

GROUP 1 - N AFF BETA WEIGHT GT .5
GROUP 2 - N AFF BETA WEIGHT LE .5

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1 PUBLISHED PAPERS							
GROUP 1	44	.2955	.734	.111	.38	66.52	.704
GROUP 2	129	.2481	.638	.056			
PERF2 TECHNICAL REPORTS							
GROUP 1	44	.4773	1.000	.151	.69	73.84	.490
GROUP 2	129	.3566	.991	.087			
PERF3 TECH MEMOS-ENGNRS							
GROUP 1	44	.9091	2.457	.370	.84	52.85	.405
GROUP 2	129	.5814	1.401	.123			
PERF4 PRESENTATIONS AT SYMPOSIA,ETC							
GROUP 1	44	1.0909	3.146	.474	1.04	46.26	.304
GROUP 2	129	.5891	1.043	.092			
PERF5 SPECS,SOWS,REP,TP							
GROUP 1	44	1.8636	2.120	.320	.29	82.52	.771
GROUP 2	129	1.7519	2.372	.209			

TABLE XI (Cont'd)

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF6 STUDIES,TR OR MGT ASSES							
GROUP 1	66	1.1667	2.203	.272	-.69	163.66	.492
GROUP 2	108	1.4352	2.898	.279			
PERF7 PRO OR TECH COMMITTEE							
GROUP 1	66	.3939	1.311	.161	-.43	160.37	.669
GROUP 2	108	.4907	1.649	.159			
OER							
GROUP 1	15	2.3220	.473	.122	.60	43.08	.554
GROUP 2	32	2.2081	.831	.147			
HOPP HOPPOCK OVALL JOB SAT							
GROUP 1	66	18.3636	4.090	.503	-1.54	131.29	.127
GROUP 2	108	19.3241	3.857	.371			

TABLE XI (Cont'd)

GROUP 1 - N POW BETA WEIGHT GT .5
GROUP 2 - N POW BETA WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	45	.2889	.727	.108	.33	69.10	.739
	GROUP 2	129	.2481	.639	.056			
PERF2	TECHNICAL REPORTS							
	GROUP 1	45	.5556	1.501	.224	.92	51.75	.362
	GROUP 2	129	.3411	.745	.066			
PERF3	TECH MEMOS-ENGNRS							
	GROUP 1	45	.4889	1.058	.158	-1.07	138.86	.284
	GROUP 2	129	.7364	1.906	.168			
PERF4	PRESENTATIONS AT SYMPOSIA,ETC							
	GROUP 1	45	1.1778	3.128	.466	1.32	47.22	.193
	GROUP 2	129	.5504	1.007	.089			
PERF5	SPECS,SOWS,REP,TP							
	GROUP 1	45	1.4444	1.546	.230	-1.38	125.55	.171
	GROUP 2	129	1.8837	2.508	.221			

TABLE XI (Cont'd)

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF6	STUDIES,TR OR MGT ASSES							
	GROUP 1	70	1.1143	2.157	.258	-.95	170.70	.345
	GROUP 2	104	1.4808	2.943	.289			
PERF7	PRO OR TECH COMMITTEE							
	GROUP 1	70	.3714	1.275	.153	-.62	169.38	.539
	GROUP 2	104	.5096	1.678	.165			
OER								
	GROUP 1	15	2.3220	.473	.122	.60	43.00	.554
	GROUP 2	32	2.2081	.831	.147			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	70	18.2857	4.079	.488	-1.83	141.89	.069
	GROUP 2	104	19.4135	3.835	.376			

TABLE XI (Cont'd)

GROUP 1 - UNADJUSTED N ACH RELATIVE WEIGHT GT .5
GROUP 2 - UNADJUSTED N ACH RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	70	.3000	.709	.085	.66	135.53	.510
	GROUP 2	104	.2308	.627	.061			
PERF2	TECHNICAL REPORTS							
	GROUP 1	70	.3571	.682	.081	-.47	169.18	.639
	GROUP 2	104	.4231	1.163	.114			
PERF3	TECH MEMOS-ENGNRS							
	GROUP 1	70	.6714	1.717	.205	-.01	149.66	.995
	GROUP 2	104	.6731	1.743	.171			
PERF4	PRESENTATIONS AT SYMPOSIA,ETC							
	GROUP 1	70	.5143	.860	.105	-1.36	144.44	.175
	GROUP 2	104	.8462	2.237	.219			
PERF5	SPECS,SOWS,REP,TP							
	GROUP 1	70	1.9571	2.737	.327	.82	115.64	.411
	GROUP 2	104	1.6442	1.950	.192			

TABLE XI (Cont'd)

PERF6	STUDIES,TR OR MGT ASSES						
	GROUP 1	45	1.1778	1.775	.265	-.57	126.56	.569
	GROUP 2	129	1.3875	2.903	.256			
PERF7	PRO OR TECH COMMITTEE						
	GROUP 1	43	.6667	2.306	.344	.80	51.69	.427
	GROUP 2	129	.3798	1.140	.100			
OER							
	GROUP 1	13	2.3969	1.040	.288	.69	14.99	.501
	GROUP 2	34	2.1862	.584	.100			
HOPP	HOPPOCK OVALL JOB SAT						
	GROUP 1	45	19.2667	3.910	.583	.61	78.23	.545
	GROUP 2	129	18.8527	3.990	.351			

TABLE XI (Cont'd)

GROUP 1 - UNADJUSTED N AFF RELATIVE WEIGHT GT .5
GROUP 2 - UNADJUSTED N AFF RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	33	.2424	.614	.107	-.17	51.56	.869
	GROUP 2	141	.2624	.672	.057			
PERF2	TECHNICAL REPORTS							
	GROUP 1	33	.3939	1.059	.184	-.02	45.84	.987
	GROUP 2	141	.3972	.985	.083			
PERF3	TECH MEMOS-ENGNRS							
	GROUP 1	33	1.0909	2.743	.477	1.05	35.90	.300
	GROUP 2	141	.5745	1.385	.117			
PERF4	PRESENTATIONS AT SYMPOSIA,ETC							
	GROUP 1	33	.6364	1.141	.199	-.37	81.92	.716
	GROUP 2	141	.7305	1.949	.164			
PERF5	SPECS,SOWS,RFP,TP							
	GROUP 1	33	1.8182	1.776	.309	.16	62.97	.873
	GROUP 2	141	1.7589	2.414	.203			

TABLE XI (Cont'd)

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF6	STUDIES,TR OR MGT ASSES							
	GROUP 1	33	1.0606	1.413	.246	-.96	101.84	.331
	GROUP 2	141	1.3972	2.868	.242			
PERF7	PRO OR TECH COMMITTEE							
	GROUP 1	33	.4848	1.093	.190	.16	68.90	.871
	GROUP 2	141	.4468	1.514	.136			
OER								
	GROUP 1	9	2.0556	.576	.192	-1.02	15.46	.323
	GROUP 2	38	2.2892	.764	.124			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	33	19.3939	3.640	.634	.75	52.13	.460
	GROUP 2	141	18.8582	4.040	.340			

TABLE XI (Cont'd)

GROUP 1 - UNADJUSTED N POW RELATIVE WEIGHT GT .5
GROUP 2 - UNADJUSTED N POW RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	37	.2432	.641	.105	-.16	58.79	.871
	GROUP 2	137	.2628	.667	.057			
PERF2	TECHNICAL REPORTS							
	GROUP 1	37	.5135	1.592	.262	.55	40.60	.585
	GROUP 2	137	.3650	.766	.065			
PERF3	TECH MEMOS-ENGNRS							
	GROUP 1	37	.1892	.660	.108	-3.15	162.20	.002
	GROUP 2	137	.8029	1.398	.162			
PERF4	PRESENTATIONS AT SYMPOSIA,ETC							
	GROUP 1	37	1.1622	3.420	.562	1.00	37.76	.322
	GROUP 2	137	.5912	1.025	.088			
PERF5	SPECS,SOWS,RFP,TP							
	GROUP 1	37	1.2973	1.525	.251	-1.84	92.28	.070
	GROUP 2	137	1.8978	2.459	.210			

TABLE XI (Cont'd)

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF6 STUDIES,TR OR MGT ASSES							
GROUP 1	37	.9459	1.840	.303	-1.27	87.28	.207
GROUP 2	137	1.4380	2.631	.242			
PERF7 PRO OR TECH COMMITTEE							
GROUP 1	37	.1622	.442	.073	-2.28	171.92	.024
GROUP 2	137	.5328	1.698	.145			
OER							
GROUP 1	12	2.1525	.447	.129	-.66	35.28	.516
GROUP 2	35	2.2760	.810	.137			
HOPP HOPPOCK OVALL JOB SAT							
GROUP 1	37	18.7568	4.205	.691	-.34	53.98	.738
GROUP 2	137	19.0146	3.909	.334			

TABLE XI (Cont'd)

GROUP 1 - ADJUSTED N ACH RELATIVE WEIGHT GT .5
GROUP 2 - ADJUSTED N ACH RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	66	.3182	.727	.089	.89	120.59	.373
	GROUP 2	108	.2222	.515	.059			
PERF2	TECHNICAL REPORTS							
	GROUP 1	66	.3485	.653	.082	-.56	171.59	.576
	GROUP 2	108	.4259	1.154	.111			
PERF3	TECH MEMOS-ENGNRS							
	GROUP 1	66	.6970	1.753	.217	.15	134.53	.885
	GROUP 2	108	.6574	1.714	.165			
PERF4	PRESENTATIONS AT SYMPOSIA,ETC							
	GROUP 1	66	.5303	.898	.111	-1.23	154.43	.220
	GROUP 2	108	.8241	2.200	.212			
PERF5	SPECS,SOWS,REP,TP							
	GROUP 1	66	1.8788	2.703	.333	.45	109.57	.651
	GROUP 2	108	1.7037	2.029	.195			

TABLE XI (Cont'd)

PERF6	STUDIES,TR OR MGT ASSES						
	GROUP 1	44	1.7045	2.699	.407	1.04	73.17	.302
	GROUP 2	129	1.2171	2.546	.233			
PERF7	PRO OR TECH COMMITTEE						
	GROUP 1	44	.4545	1.044	.157	-.01	119.86	.990
	GROUP 2	129	.4574	1.563	.147			
OER							
	GROUP 1	14	2.1429	.593	.160	-.69	32.06	.497
	GROUP 2	33	2.2876	.787	.137			
HOPP	HOPPOCK OVALL JOB SAT						
	GROUP 1	44	20.0682	3.231	.487	2.42	94.66	.017
	GROUP 2	123	18.5969	4.139	.364			

TABLE XI (Cont'd)

GROUP 1 - ADJUSTED N AFF RELATIVE WEIGHT GT .5
GROUP 2 - ADJUSTED N AFF RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	31	.2581	.531	.113	-.01	45.61	.996
	GROUP 2	143	.2587	.663	.056			
PERF2	TECHNICAL REPORTS							
	GROUP 1	31	.3871	1.086	.195	-.05	41.26	.957
	GROUP 2	143	.3986	.980	.082			
PERF3	TECH MEMOS							
	GROUP 1	31	1.1613	2.813	.506	1.15	33.17	.260
	GROUP 2	143	.5664	1.377	.115			
PERF4	PRESENTATIONS AT SYMPOSIA,ETC							
	GROUP 1	31	.6774	1.166	.209	-.16	71.26	.872
	GROUP 2	143	.7203	1.937	.162			

TABLE XI (Cont'd)

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF5 SPECS,SOWS,RFP,TP							
GROUP 1	31	1.8387	1.828	.328	.22	54.95	.829
GROUP 2	143	1.7552	2.398	.201			
PERF6 STUDIES,TR OR MGT ASSES							
GROUP 1	31	1.0645	1.436	.258	-.93	69.37	.354
GROUP 2	143	1.3916	2.851	.238			
PERF7 PRO OR TECH COMMITTEE							
GROUP 1	31	.4639	1.122	.201	.15	60.01	.881
GROUP 2	143	.4476	1.604	.134			
OER							
GROUP 1	9	2.0556	.575	.192	-1.02	15.46	.323
GROUP 2	33	2.2692	.764	.124			
HOPP HOPPOCK OVALL JOB SAT							
GROUP 1	31	19.7097	3.329	.598	1.33	51.56	.191
GROUP 2	143	18.7972	4.079	.341			

TABLE XI (Cont'd)

GROUP 1 - ADJUSTED N POW RELATIVE WEIGHT GT .5
GROUP 2 - ADJUSTED N POW RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	31	.2903	.593	.124	.28	42.43	.778
	GROUP 2	143	.2517	.555	.055			
PERF2	TECHNICAL REPORTS							
	GROUP 1	31	.5484	1.719	.307	.59	32.65	.560
	GROUP 2	143	.3636	.765	.064			
PERF3	TECH MEMOS-ENGNRS							
	GROUP 1	31	.2258	.717	.129	-2.69	125.44	.008
	GROUP 2	143	.7692	1.864	.156			
PERF4	PRESENTATIONS AT SYMPOSIA,ETC							
	GROUP 1	31	1.3548	3.711	.666	1.16	30.97	.254
	GROUP 2	143	.5734	1.010	.084			
PERF5	SPECS,SOWS,REP,TP							
	GROUP 1	31	1.3871	1.585	.285	-1.33	64.70	.187
	GROUP 2	143	1.8531	2.426	.203			

TABLE XI (Cont'd)

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF6 STUDIES,TR OR MGT ASSES							
GROUP 1	31	1.0968	1.972	.354	-1.19	26.62	.243
GROUP 2	143	1.3846	2.783	.233			
PERF7 PRO OR TECH COMMITTEE							
GROUP 1	31	.1290	.341	.061	.50	42.74	.622
GROUP 2	143	.5245	1.669	.140			
OER							
GROUP 1	10	2.0660	.439	.139	-.68	59.16	.500
GROUP 2	37	2.2927	.791	.130			
HOPP HOPPOCK OVALL JOB SAT							
GROUP 1	31	19.2903	4.117	.739	-2.59	171.79	.010
GROUP 2	143	18.8881	3.940	.329			

TABLE XI (Cont'd)

GROUP 1 - COMPLETED TECHNICAL MEMORANDA
GROUP 2 - NO TECH MEMOS COMPLETED

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
N1	AFFILIATION							
	GROUP 1	49	.3020	.305	.044	.91	92.83	.368
	GROUP 2	124	.2547	.323	.029			
N2	POWER							
	GROUP 1	50	.2109	.327	.046	-1.24	99.68	.219
	GROUP 2	124	.2609	.362	.033			
N3	ACHEIVEMENT							
	GROUP 1	50	.4598	.304	.043	.87	98.06	.387
	GROUP 2	124	.4143	.331	.030			
RW1	RELATIVE WTS N AFF							
	GROUP 1	50	.2946	.245	.035	.81	88.34	.421
	GROUP 2	124	.2615	.239	.021			
RW2	RELATIVE WTS N POW							
	GROUP 1	50	.2220	.202	.029	-2.37	127.34	.019
	GROUP 2	124	.3130	.286	.026			
RW3	RELATIVE WTS N ACH							
	GROUP 1	50	.4824	.284	.040	1.19	95.75	.236
	GROUP 2	124	.4248	.301	.027			

TABLE XI (Cont'd)

GROUP 1 - COMPLETED IN HOUSE STUDIES OR ASSESSMENTS
GROUP 2 - NON COMPLETED

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
N1 AFFILIATION							
GROUP 1	85	.2834	.314	.034	.62	170.97	.535
GROUP 2	88	.2533	.321	.034			
N2 POWER							
GROUP 1	85	.2865	.321	.035	.95	169.25	.344
GROUP 2	89	.2360	.382	.040			
N3 ACHEIVEMENT							
GROUP 1	85	.4715	.316	.034	1.77	171.97	.078
GROUP 2	89	.3852	.327	.035			
RW1 RELATIVE WTS N AFF							
GROUP 1	85	.2689	.258	.028	-.11	166.36	.912
GROUP 2	89	.2730	.225	.024			
RW2 RELATIVE WTS N POW							
GROUP 1	85	.2579	.257	.028	-1.40	171.94	.162
GROUP 2	89	.3145	.275	.029			
RW3 RELATIVE WTS N ACH							
GROUP 1	85	.4733	.303	.033	1.39	170.52	.166
GROUP 2	89	.4106	.289	.031			

TABLE XI (Cont'd)

GROUP 1 - PARTICIPATES IN PROFESSIONAL OR TECHNICAL COMMITTEE
GROUP 2 - NO COMMITTEE PARTICIPATION

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
N1	AFFILIATION							
	GROUP 1	34	.2479	.339	.058	-.39	47.65	.697
	GROUP 2	139	.2730	.313	.027			
N2	POWER							
	GROUP 1	34	.2759	.339	.058	.29	52.38	.774
	GROUP 2	140	.2570	.353	.030			
N3	ACHEIVEMENT							
	GROUP 1	34	.4811	.274	.047	1.22	59.14	.228
	GROUP 2	140	.4143	.334	.028			
RW1	RELATIVE WTS N AFF							
	GROUP 1	34	.2347	.277	.048	-.14	46.32	.885
	GROUP 2	140	.2422	.245	.021			
RW2	RELATIVE WTS N POW							
	GROUP 1	34	.2359	.252	.043	-.20	53.09	.842
	GROUP 2	140	.2457	.271	.023			
RW3	RELATIVE WTS N ACH							
	GROUP 1	34	.4494	.315	.054	.63	49.17	.530
	GROUP 2	140	.4116	.305	.026			

TABLE XII

Group T-tests of Relationship of Professor Productivity, Performnce and Satisfaction with Need Strength (Beta Weights, Relative Weights and Adjusted Relative Weights)

GROUP 1 - N ACH BETA WEIGHT GT .5
GROUP 2 - N ACH BETA WEIGHT LE .5

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1 PUBLISHED PAPERS							
GROUP 1	18	.9444	1.349	.318	-.77	36.00	.445
GROUP 2	20	1.3000	1.490	.333			
PERF2 TECHNICAL REPORTS							
GROUP 1	18	1.0000	1.328	.313	-.41	26.96	.685
GROUP 2	20	1.3000	2.958	.661			
PERF3 PRESENTATIONS AT SYMPOSIA, ETC							
GROUP 1	18	1.6667	2.401	.566	-1.00	22.53	.326
GROUP 2	20	3.6000	8.242	1.843			
OER							
GROUP 1	10	2.2340	.782	.247	1.24	17.40	.230
GROUP 2	10	1.8340	.648	.205			
HOPP HOPPOCK OVALL JOB SAT							
GROUP 1	18	21.5556	2.727	.643	-.66	35.82	.514
GROUP 2	20	22.1500	2.834	.634			

TABLE XII (Cont'd)

GROUP 1 - N AFF BETA WEIGHT GT .5
GROUP 2 - N AFF BETA WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	17	.7647	1.033	.250	-1.53	34.23	.136
	GROUP 2	21	1.4286	1.630	.356			
PERF2	TECHNICAL REPORTS							
	GROUP 1	17	1.5882	3.203	.777	.95	19.44	.353
	GROUP 2	21	.8095	1.167	.255			
PERF3	PRESENTATIONS AT SYMPOSIA, ETC							
	GROUP 1	17	4.2353	9.045	2.194	1.27	16.65	.222
	GROUP 2	21	1.4286	1.434	.313			
OER								
	GROUP 1	8	1.8550	.721	.255	-.90	15.44	.384
	GROUP 2	13	2.1533	.740	.214			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	17	22.7059	2.687	.652	1.73	34.41	.093
	GROUP 2	21	21.1905	2.695	.588			

TABLE XII (Cont'd)

GROUP 1 - N POW BETA WEIGHT GT .5
GROUP 2 - N POW BETA WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	9	2.0000	2.000	.667	1.59	9.60	.144
	GROUP 2	28	.8929	1.100	.208			
PERF2	TECHNICAL REPORTS							
	GROUP 1	9	1.2222	2.224	.741	.05	14.54	.961
	GROUP 2	23	1.1786	2.405	.454			
PERF3	PRESENTATIONS AT SYMPOSIA, ETC							
	GROUP 1	9	5.2222	12.008	4.003	.83	8.26	.428
	GROUP 2	28	1.8571	2.677	.506			
OER								
	GROUP 1	6	1.6667	.816	.333	-1.31	8.33	.227
	GROUP 2	13	2.1677	.677	.188			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	9	22.6667	1.658	.553	1.03	22.31	.313
	GROUP 2	28	21.6929	2.671	.505			

TABLE XII (Cont'd)

GROUP 1 - UNADJUSTED N ACH RELATIVE WEIGHT GT. .5
GROUP 2 - UNADJUSTED N ACH RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS OR GPA-STDNTS							
	GROUP 1	14	1.2143	1.424	.381	.27	27.62	.787
	GROUP 2	24	1.0833	1.442	.294			
PERF2	TECHNICAL REPORTS							
	GROUP 1	14	1.0000	1.359	.363	-.38	35.37	.710
	GROUP 2	24	1.2500	2.739	.559			
PERF3	TECH MEMOS-ENGNRS OR PRESENTATIONS-PROFS							
	GROUP 1	14	1.2857	1.326	.354	-1.38	25.29	.181
	GROUP 2	24	3.5000	7.684	1.568			
OER								
	GROUP 1	9	2.3711	.691	.230	2.01	16.93	.061
	GROUP 2	11	1.7582	.664	.200			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	14	21.0714	2.658	.766	-1.35	25.57	.190
	GROUP 2	24	22.3333	2.648	.541			

TABLE XII (Cont'd)

GROUP 1 - UNADJUSTED N AFF RELATIVE WEIGHT GT .5
GROUP 2 - UNADJUSTED N AFF RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS OR GPA-STDNTS							
	GROUP 1	10	.7000	.675	.213	-1.59	34.60	.120
	GROUP 2	28	1.2857	1.584	.299			
PERF2	TECHNICAL REPORTS							
	GROUP 1	10	1.5000	3.719	1.176	.38	10.25	.710
	GROUP 2	28	1.0357	1.621	.306			
PERF3	TECH MEMOS-ENGNRS OR PRESENTATIONS-PROFS							
	GROUP 1	10	2.4000	3.098	.980	-.23	34.11	.817
	GROUP 2	28	2.7857	7.036	1.330			
OER								
	GROUP 1	4	1.7100	.700	.350	-1.02	4.81	.353
	GROUP 2	15	2.1150	.735	.184			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	10	22.2000	3.393	1.073	.36	12.86	.708
	GROUP 2	23	21.7500	2.562	.484			

TABLE XII (Cont'd)

GROUP 1 - UNADJUSTED N POW RELATIVE WEIGHT GT .5
GROUP 2 - UNADJUSTED N POW RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS OR GPA-STDNTS							
	GROUP 1	4	1.5000	1.000	.500	.74	4.68	.495
	GROUP 2	34	1.0882	1.464	.251			
PERF2	TECHNICAL REPORTS							
	GROUP 1	4	1.0000	0	0	-.42	33.00	.676
	GROUP 2	34	1.1765	2.443	.419			
PERF3	TECH MEMOS-ENGNRS OR PRESENTATIONS-PROFS							
	GROUP 1	4	1.5000	2.380	1.190	-.81	9.92	.436
	GROUP 2	34	2.8235	6.516	1.117			
OER								
	GROUP 1	3	2.0000	1.000	.577	-.07	2.37	.953
	GROUP 2	17	2.0400	.711	.172			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	4	21.7500	2.986	1.493	-.08	3.64	.937
	GROUP 2	34	21.8824	2.783	.477			

TABLE XII (Cont'd)

GROUP 1 - ADJUSTED N ACH RELATIVE WEIGHT GT .5
GROUP 2 - ADJUSTED N ACH RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	13	1.2308	1.481	.411	.30	23.41	.765
	GROUP 2	25	1.0800	1.412	.282			
PERF2	TECHNICAL REPORTS							
	GROUP 1	13	1.0000	1.414	.392	-.36	35.96	.720
	GROUP 2	25	1.2400	2.581	.536			
PERF3	PRESENTATIONS AT SYMPOSIA, ETC							
	GROUP 1	13	1.3846	1.325	.368	-1.27	26.74	.215
	GROUP 2	25	3.3600	7.555	1.511			
OER								
	GROUP 1	9	2.3711	.691	.230	2.01	16.93	.061
	GROUP 2	11	1.7582	.664	.200			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	13	21.1538	2.968	.823	-1.11	22.00	.278
	GROUP 2	25	22.2400	2.634	.527			

TABLE XII (Cont'd)

GROUP 1 - ADJUSTED N POW RELATIVE WEIGHT GT .5
GROUP 2 - ADJUSTED N POW RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	4	1.5000	1.000	.500	.74	4.68	.495
	GROUP 2	34	1.0882	1.464	.251			
PERF2	TECHNICAL REPORTS							
	GROUP 1	4	1.0000	0	0	-.42	33.00	.676
	GROUP 2	34	1.1765	2.443	.419			
PERF3	PRESENTATIONS AT SYMPOSIA, ETC							
	GROUP 1	4	1.5000	2.380	1.190	-.81	9.92	.436
	GROUP 2	34	2.8235	6.516	1.117			
OER								
	GROUP 1	3	2.0000	1.000	.577	-.07	2.37	.953
	GROUP 2	17	2.0400	.711	.172			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	4	21.7500	2.986	1.493	-.08	3.64	.937
	GROUP 2	34	21.8824	2.783	.477			

TABLE XII (Cont'd)

GROUP 1 - ADJUSTED N AFF RELATIVE WEIGHT GT .5
GROUP 2 - ADJUSTED N AFF RELATIVE WEIGHT LE .5

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
PERF1	PUBLISHED PAPERS							
	GROUP 1	10	.7000	.675	.213	-1.59	34.60	.120
	GROUP 2	28	1.2857	1.584	.299			
PERF2	TECHNICAL REPORTS							
	GROUP 1	10	1.5000	3.719	1.176	.38	10.25	.710
	GROUP 2	23	1.0357	1.621	.306			
PERF3	PRESENTATIONS AT SYMPOSIA, ETC							
	GROUP 1	10	2.4000	3.098	.980	-.23	34.11	.817
	GROUP 2	23	2.7857	7.035	1.330			
OER								
	GROUP 1	4	1.7100	.700	.350	-1.02	4.61	.353
	GROUP 2	16	2.1150	.735	.184			
HOPP	HOPPOCK OVALL JOB SAT							
	GROUP 1	10	22.2000	3.393	1.073	.38	12.86	.708
	GROUP 2	28	21.7500	2.552	.484			

TABLE XII (Cont'd)

GROUP 1 - PUBLISHED IN JOURNALS
GROUP 2 - NOT PUBLISHED IN JOURNALS

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
N1	AFFILIATION							
	GROUP 1	24	.3607	.287	.058	-.99	23.55	.333
	GROUP 2	14	.4681	.343	.092			
N2	POWER							
	GROUP 1	24	.3702	.279	.057	1.23	25.50	.232
	GROUP 2	13	.2550	.270	.075			
N3	ACHEIVEMENT							
	GROUP 1	24	.3839	.402	.082	-1.11	33.83	.276
	GROUP 2	14	.5102	.297	.079			
RW1	RELATIVE WTS N AFF							
	GROUP 1	24	.2971	.269	.055	-.83	20.49	.416
	GROUP 2	14	.3943	.386	.103			
RW2	RELATIVE WTS N POW							
	GROUP 1	24	.3092	.233	.048	2.47	35.38	.019
	GROUP 2	14	.1543	.153	.041			
RW3	RELATIVE WTS N ACH							
	GROUP 1	24	.3946	.316	.065	-.45	24.07	.655
	GROUP 2	14	.4479	.369	.098			

TABLE XIII

Overall Frequency Distributions
of Demographic and Factor Variables

VOC

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
ENGINEER	1	126	31.9	31.9	31.9
TECHNICIAN	2	16	4.1	4.1	36.0
SCIENTIST	3	31	7.8	7.8	43.8
MANAGER	4	70	17.7	17.7	61.5
STAFF PERSON	5	45	11.4	11.4	72.9
ADMINISTRATOR	6	4	1.0	1.0	73.9
PROFESSOR	7	38	9.6	9.6	83.5
CHAPLAINS	8	28	7.1	7.1	90.6
	9	37	9.4	9.4	100.0
	TOTAL	395	100.0	100.0	

TABLE XIII (Cont'd)

AGE

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
LESS THAN 25 YRS	1	10	2.5	2.5	2.5
25-29 YRS	2	102	25.8	25.8	28.4
30-34 YRS	3	140	35.4	35.4	63.8
35-39 YRS	4	59	14.9	14.9	78.7
40-44 YRS	5	45	11.4	11.4	90.1
45-49 YRS	6	17	4.3	4.3	94.4
50-54 YRS	7	10	2.5	2.5	97.0
55-59 YRS	8	9	2.3	2.3	99.2
60 YRS OR MORE	9	3	.8	.8	100.0
	TOTAL	395	100.0	100.0	

TABLE XIII (Cont'd)

EDL EDUCATION LEVEL

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
LESS THAN BACH	1	5	1.3	1.3	1.3
BACH DEGREE	2	64	16.2	16.2	17.5
BACH +	3	146	37.0	37.1	54.6
MASTERS	4	71	18.0	18.0	72.6
MASTERS +	5	59	14.9	15.0	87.5
DOCTORAL	6	49	12.4	12.4	100.0
OUT OF RANGE		1	.3	MISSING	
	TOTAL	395	100.0	100.0	

EDD EDUCATION MAJOR

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
ENGINEER	1	195	49.4	49.4	49.4
MANAGEMENT	2	31	7.8	7.8	57.2
BUSINESS	3	14	3.5	3.5	60.8
ARTS	4	7	1.8	1.8	62.5
SCIENCES	5	105	26.6	26.6	89.1
THEOLOGY	6	27	6.8	6.8	95.9
OTHER	7	12	3.0	3.0	99.0
NO DEGREE	8	4	1.0	1.0	100.0
	TOTAL	395	100.0	100.0	

TABLE XIII (Cont'd)

GRD CIV OR MILT GRADE

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
GS8 OR GS9	1	6	1.5	1.5	1.5
GS10	2	1	.3	.3	1.8
GS11	3	12	3.0	3.0	4.8
GS12	4	46	11.6	11.6	16.5
GS13	5	51	12.9	12.9	29.4
GS14 ABOVE	6	23	5.8	5.8	35.2
01 OR 02	7	28	7.1	7.1	42.3
03	8	184	46.6	46.6	88.9
04	9	24	6.1	6.1	94.9
05	10	12	3.0	3.0	98.0
06	11	2	.5	.5	98.5
07	12	6	1.5	1.5	100.0
	TOTAL	395	100.0	100.0	

TABLE XIII (Cont'd)

PTR9 PORTER N ACH IMPORTANCE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	1.	1	.3	.3	.3
	2.	7	1.8	1.8	2.0
	3.	30	7.6	7.6	9.6
	4.	105	26.6	26.6	36.2
	5.	157	39.7	39.7	75.9
	6.	86	21.8	21.8	97.7
	7.	9	2.3	2.3	100.0
	TOTAL	395	100.0	100.0	

PTR3 PORTER N AFF IMPORTANCE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	0	4	1.0	1.0	1.0
	1.	8	2.0	2.0	3.0
	2.	9	2.3	2.3	5.3
	3.	19	4.8	4.8	10.1
	4.	25	6.3	6.3	16.5
	5.	86	21.8	21.8	38.2
	6.	47	11.9	11.9	50.1
	7.	83	21.0	21.0	71.1
	8.	57	14.4	14.4	85.6
	9.	57	14.4	14.4	100.0
	TOTAL	395	100.0	100.0	

TABLE XIII (Cont'd)

PTR6 PORTER N POW IMPORTANCE

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
	1	24	6.1	6.1	6.1
	2	5	1.3	1.3	7.4
	3	18	4.6	4.6	12.0
	4	31	7.8	7.9	19.9
	5	66	16.7	16.9	36.8
	6	42	10.6	10.7	47.6
	7	66	16.7	16.9	64.5
	8	55	13.9	14.1	78.5
	9	84	21.3	21.5	100.0
	BLANK	4	1.0	MISSING	
	TOTAL	395	100.0	100.0	

TABLE XIII (Cont'd)

PTR7 PCVD ACH JOB SCOPE

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
	1	31	7.8	7.9	7.9
	2	22	5.6	5.6	13.5
	3	57	14.4	14.5	28.1
	4	50	12.7	12.8	40.8
	5	67	17.0	17.1	57.9
	6	41	10.4	10.5	68.4
	7	39	9.9	9.9	78.3
	8	40	10.1	10.2	88.5
	9	45	11.4	11.5	100.0
	BLANK	3	.8	MISSING	
	TOTAL	395	100.0	100.0	

TABLE XIII (Cont'd)

PTR1 PCVD AFF JOB SCOPE

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
	1	2	.5	.5	.5
	2	1	.3	.3	.8
	3	10	2.5	2.6	3.3
	4	20	5.1	5.1	8.4
	5	60	15.2	15.3	23.7
	6	39	9.9	9.9	33.7
	7	73	18.5	18.6	52.3
	8	71	18.0	18.1	70.4
	9	116	29.4	29.6	100.0
	BLANK	3	.8	MISSING	
	TOTAL	395	100.0	100.0	

TABLE XIII (Cont'd)

PTR4 PCVD POW JOB SCOPE

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
	0	1	.3	.3	.3
	1	10	2.5	2.6	2.8
	2	7	1.8	1.8	4.6
	3	13	3.3	3.3	7.9
	4	26	6.6	6.6	14.5
	5	70	17.7	17.9	32.4
	6	31	7.8	7.9	40.3
	7	71	18.0	18.1	58.4
	8	65	16.5	16.6	75.0
	9	98	24.8	25.0	100.0
	BLANK	3	.8	MISSING	
	TOTAL	395	100.0	100.0	

TABLE XI-II (Cont'd)

FSAT3 FACET SAT ACH

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
	0	194	49.1	49.1	49.1
	1	55	13.9	13.9	63.0
	2	45	11.4	11.4	74.4
	3	32	8.1	8.1	82.5
	4	33	8.4	8.4	90.9
	5	14	3.5	3.5	94.4
	6	9	2.3	2.3	96.7
	7	5	1.3	1.3	98.0
	8	8	2.0	2.0	100.0
	TOTAL	395	100.0	100.0	

FSAT1 FACET SAT AFF

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
	0	346	87.6	87.6	87.6
	1	21	5.3	5.3	92.9
	2	16	4.1	4.1	97.0
	3	4	1.0	1.0	98.0
	4	6	1.5	1.5	99.5
	6	1	.3	.3	99.7
	7	1	.3	.3	100.0
	TOTAL	395	100.0	100.0	

TABLE XIII (Cont'd)

FSAT2 FACET SAT POW

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
	0	312	79.0	79.0	79.0
	1	34	8.6	8.6	87.6
	2	22	5.6	5.6	93.2
	3	10	2.5	2.5	95.7
	4	4	1.0	1.0	96.7
	5	4	1.0	1.0	97.7
	6	7	1.8	1.8	99.5
	8	2	.5	.5	100.0
	TOTAL	395	100.0	100.0	

HOPP HOPPOCK OVALL JOB SAT

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	PCT	CUM PCT
6	1	0	0	14	7	2	12	22	65	16	79
7	4	1	1	15	15	4	15	23	39	10	89
8	3	1	2	16	18	5	20	24	20	5	94
9	3	1	3	17	17	4	24	25	11	3	97
10	6	2	4	18	26	7	31	26	5	1	98
11	3	1	5	19	41	10	41	27	3	1	99
12	5	2	7	20	36	9	50	28	3	1	100
13	13	3	10	21	50	13	63				

VITA

Billy G. Thomas, Jr. was born in Anniston, Alabama on 7 September 1950. He graduated from Saks High School in Anniston in 1968 and attended Auburn University, Auburn, Alabama from which he graduated in 1972 with a Bachelor's degree in Industrial Engineering and a commission in the United States Air Force.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The policy-capturing technique was used to measure the strength of individuals' needs for achievement, affiliation, and power. The cues used in the exercise were based upon the descriptions of the three needs presented by McClelland. The populationsample consisted of over 395 personnel assigned primarily to five vocations - engineers and scientists, managers, staff persons, professors, and chaplains. The organizations sampled were the Air Force Avionics Laboratory, WPAFB, OH, Air Force Insti-

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tute of Technology, WPAFB, OH, and Air Force Chaplains School, Maxwell AFB, AL. Analyses were performed using the standardized beta weights and relative weights derived from the linear multiple regression analysis employed in the policy-capturing methodology. Additional analyses consisted of descriptive techniques, multivariate analysis of variance, and t-tests to examine the vocational profiles of the weights and the relationship of the weights to performance and and job satisfaction. The results of the research indicated that policy-capturing appeared useful as a motivational measurement technique. However, few motive-behavior relationships predicted from McClellands research into the needs held true for this study. Organizational or Individual factors appeared to strongly attenuate any monotonic relationship between need strength and behavior that may have existed.