A Comparison of Clinical and Mechanical Combination of Assessment Center Data

Patrick J. Gilbert
University of Central Florida

This Masters Thesis (Open Access) is brought to you for free and open access by STARS. It has been accepted for inclusion in Retrospective Theses and Dissertations by an authorized administrator of STARS. For more information, please contact STARS@ucf.edu.

STARS Citation
A COMPARISON OF CLINICAL AND MECHANICAL COMBINATION OF ASSESSMENT CENTER DATA

BY

PATRICK JOSEPH GILBERT
B.A., Florida Technological University, 1977

THESIS

Submitted in partial fulfillment of the requirements for the Master of Science degree in Psychology in the Graduate Studies Program of the College of Arts and Sciences University of Central Florida Orlando, Florida

Summer Term 1982
ACKNOWLEDGMENTS

The author would like to thank Dr. Cabot Jaffee for his advice and assistance in formulating the original proposal for this research. The author would also like to thank Dr. Robert Loesch for his counsel and invaluable assistance in collecting the research data.

A special thanks is extended to Dr. Erwin Shirkey for his assistance in the preparation of this paper and informative critique of the completed text. Dr. Shirkey has also served as a source of professional counsel which I greatly appreciate and respect.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Tables</td>
<td>v</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Method</td>
<td>19</td>
</tr>
<tr>
<td>Procedure</td>
<td>23</td>
</tr>
<tr>
<td>Results</td>
<td>27</td>
</tr>
<tr>
<td>Discussion</td>
<td>32</td>
</tr>
<tr>
<td>Conclusion</td>
<td>39</td>
</tr>
<tr>
<td>Appendices</td>
<td></td>
</tr>
<tr>
<td>A. Assessment Center Skill Definitions</td>
<td>44</td>
</tr>
<tr>
<td>B. Summary Exercise Overviews</td>
<td>46</td>
</tr>
<tr>
<td>C. Skill Matrix</td>
<td>49</td>
</tr>
<tr>
<td>D. Performance Survey Analysis Form</td>
<td>50</td>
</tr>
<tr>
<td>Tables</td>
<td>62</td>
</tr>
<tr>
<td>References</td>
<td>76</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Means and Standard Deviations for Clinically Combined and Mechanically Combined Ratings</td>
<td>63</td>
</tr>
<tr>
<td>2.</td>
<td>Means and Standard Deviations for Total Criterion and Subscales</td>
<td>64</td>
</tr>
<tr>
<td>3.</td>
<td>Correlation Matrix for Skill Ratings and Total Criterion Score</td>
<td>65</td>
</tr>
<tr>
<td>4.</td>
<td>Eigen Values for Factor Analysis of Criterion Subscales</td>
<td>67</td>
</tr>
<tr>
<td>5.</td>
<td>Varimax Rotated Factor Matrix for Clinically Combined Skills</td>
<td>68</td>
</tr>
<tr>
<td>6.</td>
<td>Varimax Rotated Factor Matrix for Mechanically Combined Skills</td>
<td>69</td>
</tr>
<tr>
<td>7.</td>
<td>Similarity Coefficients for Clinical and Mechanical Factors</td>
<td>70</td>
</tr>
<tr>
<td>8.</td>
<td>Summary Table for Multiple Regression Analysis of Clinically Combined Skill Ratings</td>
<td>71</td>
</tr>
<tr>
<td>9.</td>
<td>Variables not Included in Regression Equation for Clinically Combined Skill Ratings</td>
<td>72</td>
</tr>
<tr>
<td>10.</td>
<td>Summary Table for Multiple Regression Analysis of Mechanically Combined Skill Ratings</td>
<td>73</td>
</tr>
<tr>
<td>11.</td>
<td>Summary Table for Multiple Regression Analysis of Mechanically and Clinically Combined Skill Ratings</td>
<td>74</td>
</tr>
<tr>
<td>12.</td>
<td>Variables not Included in Regression Equation for Mechanically and Clinically Combined Skill Ratings</td>
<td>75</td>
</tr>
</tbody>
</table>
INTRODUCTION

Background

Assessment centers have survived the tests of time and scientific scrutiny to become an orthodox method of human resource management. Assessment centers are one of the few personnel methodologies to have been established on a solid research base prior to their widespread acceptance by public and private institutions (Huck, 1977). By using multiple assessment techniques, by standardizing methods of documentation and evaluation of behaviors, and by pooling the judgments of multiple assessors in rating a participant's behavior, the assessment center method embodies sound psychometric principles (Cascio & Silbey, 1979). Evaluative research has supported the psychometric merit of the method; assessment centers have been shown to contain high interrater reliability (Bray & Grant, 1966; Greenwood & McNamara, 1967), internal consistency reliability (Archambeau, 1979; McConnell & Parker, 1972), and test-retest reliability (Moses, 1973). The method has also been shown to be highly valid in predicting future job success (Bray & Grant, 1966; Jaffee, Bender & Calvert, 1970; Kraut & Scott, 1972; Mitchell, 1975), and equally valid for blacks and whites (Huck & Bray, 1976; Jaffee, Cohen, & Cherry, 1972) as well
as males and females (Moses & Boehm, 1975). Additionally, the high content validity inherent in the design and development of assessment centers has contributed to their use in organizations sensitive to equal employment concerns (Byham, 1977; Cohen, 1977). According to Norton and Edinger (1978), federal enforcement agencies such as the Civil Service Commission and the Equal Employment Opportunity Commission have encouraged organizations to use assessment centers. It has been averred that the average validity of the assessment center is as high as the maximum validity attained by use of traditional selection methods (Norton, 1977). These factors have contributed to the explosive growth of assessment center use over the past decade: from an estimated 12 organizations operating centers in 1969 (Byham, 1977), to over 2,000 operating centers by 1980 (Parker, 1980).

Disadvantages of the Assessment Center

A large number of organizations find themselves unable to utilize the assessment center method as a tool for human resource management. The reasons many organizations elect not to use the proven assessment center method are varied.

Although assessment centers can yield a high return on investment (Cascio & Silbey, 1979; Cohen, 1980), practitioners cite the two inter-related factors of time and cost as sometimes being prohibitive in developing and operating an assessment center. Assessment centers can be a costly
and time-consuming process. First, there are the direct costs associated with the materials and facilities required to run the center. These include staff support functions such as typists and clerical personnel, and external professionals who are often involved with the development of exercise materials, training of the assessment center staff, and officiating over the center's operation.

Second, and even more substantial, are the indirect costs associated with lost time from the job for all company personnel staffing and participating in the center. Assessees usually range from first-level supervisory to middle-management positions (Gilbert & Jaffee, 1982), while in-house assessors are typically two organizational levels above the assessees (Bender, 1973; Bray, 1976). An assessment center cycle commonly runs three days in length; two days for assessment of the assessees and one day for team meetings where the assessors arrive at consensus ratings for each assessees (Bender, 1973; Cascio & Silbey, 1979). Additional time is also required for assessor training should the organization elect to use in-house assessors. Assessor training can range from one day to three weeks (Jaffee & Frank, 1978), with most training requiring a minimum of three days and a maximum of one week (Byham, 1977). The fact that assessors are drawn from second-level supervision or above places a premium on their
time, and the organization must be able to accommodate a
loss of these key management personnel for six days or more.

Another time-related disadvantage involves the number
of participants that can be assessed in a given amount of
time. Although the assessment center method enjoys much
higher criterion-related validity than traditional selection
devices (Huck, 1973), it is cumbersome in regard to the num-
ber of persons that can be evaluated at any one time; the
average three-day cycle evaluates a maximum of six parti-
cipants (Bender, 1973).

An organization might need to assess a large number of
people due to the difficulty of finding a qualified employee
for a position and/or the necessity of securing placements
for a large number of positions. In this instance, the or-
ganization could operate a single center for an extended
period of time or operate several centers simultaneously.
In the case of both alternatives, the problem earlier dis-
cussed arises: lost job-time for management personnel. This
is particularly burdensome to smaller organizations where
the number of personnel participating in the center may re-
present a sizable percentage of their managerial staff.
Traditional methods (e.g.; paper and pencil tests), though
not as accurate in their ability to identify successful
employees (Albrecht, Glaser & Marks, 1964; Hinrichs, 1969;
Norton & Edinger, 1978), can be administered and evaluated
in a comparatively shorter amount of time.
Reducing Assessment Center Costs

Thus, it appears that assessment centers are clearly a costly and time-consuming method (Glueck, 1974; Hinrichs, 1969). However, methods for reducing the cost have been suggested. Filer (1979) suggested that organizations adopt a consortium approach in their design and implementation of an assessment center. This plan calls for several organizations to pool their resources and to develop one center that can be used by all. The restriction of this approach is obvious. The participating organizations must be assessing for positions that are similar in their requisite duties, tasks, and responsibilities. The more dissimilar the positions are, the more the center's content validity will be reduced. This is a serious drawback because content validity has been used in the past to legally defend the use of assessment centers as a selection device (APA, 1974; Filer, 1979; U.S. District Court, 1975).

Another cost-reduction strategy employed by organizations is to purchase "off-the-shelf" exercises (Byman, 1977; Cohen 1980). "Off-the-shelf" refers to a simulation exercise that has not been designed specifically for the job in question. These exercises are marketed by external consultants who charge a certain rate per candidate being assessed. "Off-the-shelf" exercises can be less expensive when an organization has only a small number of individuals to assess; it may not pay to specially design situational
exercises for such limited use. Purchasing newly developed exercises, on the other hand, can be a more cost effective approach when evaluating a large number of individuals; because the total development cost can be distributed over the total number of candidates being assessed (Cohen, 1980). "Off-the-shelf" exercises encounter the disadvantage of reduced content validity and the potential disadvantage of a reduction in the center's "face validity," which refers to the degree to which a measurement device resembles and appears relevant to the position for which it is measuring. Although not a numerical index subject to statistical analysis, the presence of face validity enhances the acceptance of the measurement device and its results by those persons whose performance is being measured (Kraut, 1972).

Another strategy for reducing indirect costs involves using external consultants to serve as assessors (McCrimmon, 1978). This strategy has the advantage of eliminating time lost from the job for those high-level supervisors who would have otherwise served as assessors. A major shortcoming of this strategy is that an organization loses the benefits that would have been gained from having its managers participate in assessor training. In the course of becoming an assessor, managers undergo training in documenting behavior, classifying behaviors into skill categories, and objectively evaluating behaviors to arrive at numerical ratings (Frank & Whipple, 1978). Kraut (1972) states that assessor training
may serve "in lieu of other management development courses, specifically to become more astute in behavioral obser-
vation, group dynamics and problem solving" (p. 325).
Assessor training also serves as a means of increasing commitment, knowledge, and support of the assessment process (Byham, 1977). By using external assessors, the organi-
ization also acquires the additional disadvantage of direct cost payments to the external consultant(s).

These methods for reducing a center's cost and length share a common element: they each compromise some type of advantage typically associated with the assessment center process.

The purpose of this research is to investigate the question: How might an assessment center reduce its length of operation, thereby achieving more efficient use of com-
pany resources? An examination of operational assessment centers points to elimination of the team meeting process as one potential avenue of cost savings.

The Assessor Team Meeting

Prior to the team meeting, which occurs on the last day of the assessment cycle, the assessors have observed each assessee in several situations. Each assessor compiles an exercise report documenting the behaviors observed in a given situation. In this report, behaviors are categorized along predefined skill dimensions and the assessor
determines a numerical rating for each skill. The assessors then have a group meeting where they arrive at an overall consensus rating for each participant on each skill dimension (Task Force on Assessment Center Standards, 1980). During the team meeting each assessor discusses the behaviors he/she has observed for each skill in each situation. The assessors independently arrive at overall skill ratings and the group is then allowed to discuss and reconcile differences of opinion (Bray, 1976; Sackett & Hakel, 1979). Thus, through the team meeting a participant is less subject to inflated or deflated ratings through individual judgment error. For example, an assessor may misclassify or overemphasize a particular behavior and arrive at an inappropriate skill rating. During the team meeting process the other assessors can discover this judgment error and correct for it when arriving at a consensus for the overall skill rating. The team meeting also offers a forum for resolving any questions or issues that may arise concerning a participant's performance.

As previously mentioned, however, the team meeting typically consumes 1/3 of the assessment center cycle and, as such, is an expensive component of the assessment center method. Despite this fact, little research has been done to determine the utility of the team meeting to the overall assessment process. To what extent does the team meeting enhance the evaluation of employees and increase the
predictive validity of the assessment? And does this increase warrant the additional time and expense involved? The author suggests that other methods of arriving at overall skill ratings may prove to be less expensive and time-consuming than the team meeting, but equally valid, and therefore of greater utility to the assessment center process.

Clinical vs. Mechanical Combination of Behavioral Data: The Research Debate

In proposing alternatives to the assessor team meeting, one must first examine the issue of data combination. Sawyer (1966) suggested that methods of combining measurement data can be classified into two broad strategies: "clinical" and "mechanical" combination. He stated: "'Clinical' and 'mechanical' here correspond, more or less, to distinctions made elsewhere between nonmechanical and mechanical, clinical and statistical, subjective and objective, case study and actuarial, qualitative and quantitative" (p. 180).

Korman (1968) stated that the clinical or judgmental strategy involved "an intermediary who combines a set of scores and/or impressions (that may come from any combination of these sources of data) in some subjective, intuitive fashion and then makes predictions as to the individual's standings on the criterion variables" (p. 296). This
definition is descriptive of the team meeting process, where the assessors act as "an intermediary" in the judgmental pooling of exercise data to arrive at overall numerical ratings for each skill category. The overall skill ratings then serve as predictors of an assessee's competence in job-related skills.

By comparison, mechanical combination has been described by Meehl (1954) as "some straightforward application of an equation or table to the data ... The defining property is that no juggling or inferring or weighting is done by a skilled clinician" (pp. 15-16). This definition was supported by Sawyer (1966) who stated, "'mechanical combination' includes any set of rules whose application is objective, whatever mixture of experience and intuition their derivation involves" (p. 180).

The issue of clinical vs. mechanical combination of data has been an ongoing debate which researchers have yet to resolve. This issue is an extremely critical concern for assessment centers because it impacts heavily on both the validity and the utility of the process. As Howard (1974) put it:

The assessment center approach has not necessarily demonstrated the superiority of the clinical over actuarial (mechanical) combination of data, however. What the research has shown is: (a) clinical interpretation of tools such as projective tests and interviews can make a contribution; that is clinical measurement can work, as found by Sawyer (1966); and (b) clinical combination of data into an overall prediction of success can work. What the data have not shown
is that clinical combinations of data are the best selection procedures (p. 130).

There has not been a great deal of research conducted in the area of data combination and assessment center operations, particularly in regard to the assessor team meeting. What research has been produced in this area has yielded conflicting results and, rather than resolve the issue, has intensified the debate.

Most of this research has centered around investigations of the overall assessment rating. Typically, these ratings are a single numerical evaluation summarizing a participant's performance in the assessment center and/or the candidate's overall ability as a manager (Albrecht, Glaser, & Marks, 1969). This rating is a composite of the overall ratings for each skill dimension measured. Like the overall skill ratings, the overall assessment rating requires several assessors to combine diverse data in formulating a single judgmental rating (Moses, 1972; Sackett & Hakel, 1979; Schmitt, 1977; Wollowick & McNamara, 1969).

In a review of literature pertaining to the prediction of managerial performance, Korman (1968) supported clinical combination of behavioral data. Korman reviewed several assessment center studies where predictions were made regarding the expected job success of assessees. In these studies, predictions were correlated against job criteria such as managerial level changes, peer and superior rankings, and superior ratings of job performance. It was
Korman's opinion that "judgmental prediction" methods, as exemplified by executive assessment procedures can do as well as, or better than, "actuarial prediction."

Campbell, Otis, Liske, and Prien (1962) correlated specific scores from psychological tests, interviews, and reports with supervisory ratings of job performance. Psychologists formulated predictive ratings of job performance based on their interpretation of psychometric test data. These ratings were correlated with the supervisory ratings of actual job performance. In general, the psychologists' ratings were more highly correlated with the job performance measure than were the objective test data. From this, Campbell et al. conclude that a clinical interpretation of psychometric test data is more valid in predicting future job performance than actuarial combination using test data alone.

Moses (1972) correlated two methods of combining assessment center data with a criterion variable of management progress. The mechanical combination of assessment center variables produced a multiple correlation of .463, while the clinical combination, expressed as the assessors' "final global assessment rating," produced a correlation of .44. From this, Moses concluded that there was insufficient evidence to indicate superiority for the mechanical combination of assessment center variables, the statistically refined multiple regression equation.
Huck (1974) obtained similar results and found that information which was clinically combined to produce an overall assessment rating was of equal validity to information mechanically combined via a regression equation. Both measures were correlated with a criterion variable of "overall job performance" and "potential for advancement." The clinical rating was found to correlate .42 with overall job performance and .59 with potential for advancement, while the mechanical combination of data yielded correlations of .42 and .56 respectively. From this, Huck discounted the superiority of mechanical combination of skill dimensions and supported the use of assessors in clinically integrating diverse sources of behavioral data.

Lastly, Mitchell (1975) compared the validity of clinical combination in the overall assessor rating to mechanical combination in a stepwise multiple regression equation for predicting the criterion of salary growth. Mitchell found no marked superiority for the mechanical combination in comparison to the clinical combination of data, having obtained average correlations of .28 and .22 respectively. In summary, it was the opinion of these researchers that clinical combination of data was superior or at least equivalent to a mechanical mode of data combination.

In comparison, other research has supported investigating the use of mechanical modes of data combination. Sawyer (1966) compared clinical and mechanical methods of
both data measurement and combination in a review of 45 studies where psychological tests, job satisfaction, academic grades and vocational performance were examined. Overall, Sawyer found mechanical modes of data combination to be superior to clinical methods. Sawyer found this to be true even in instances where the data to be combined had been collected through clinical means; this is descriptive of the process whereby assessment center data is collected through the observation and documentation of behavior. Sawyer also states that clinical and mechanical modes of data collection and combination should be viewed as a continuum and, in citing Holt (1958), states that practitioners "should try to find the optimal combination of actuarially controlled methods and sensitive clinical judgment for any particular enterprise" (p.12).

In a landmark study, Wollowick and McNamara (1969) demonstrated "greater predictiveness through statistical combination of the program variables, rather than a subjectively derived overall rating" (p. 348). In this study, participants were evaluated using cognitive ability tests, personality inventories, measures of leadership ability, and background history. In addition, participants were also evaluated in six different situational exercises. At the conclusion of the two day assessment cycle, assessor teams met and assigned an overall assessment rating (OAR) to each participant. The clinically derived OAR was the result of
the assessor's subjective combination of a participant's evaluation in all the program's variables. A mechanically derived OAR was formulated through a stepwise multiple regression of the assessment center variables. The clinical combination correlated .37 with a criterion of "increase in managerial responsibility," while a mechanical combination correlated .62 with the criterion. The authors conclude that a possible means of improving the assessment center program might involve deriving the OAR through a statistical procedures which "...should greatly increase the predictiveness of the program" (p. 352).

In a review of assessment center-related research, Howard (1974) cited several instances where clinical combination of data was useful, but mechanical combination proved superior. Howard concludes that, "...it certainly appears advisable for other centers to research the hypothesis that mechanical combination of data may improve predictions even more" (p. 131). She further points out: "Should this prove true, once the research costs were recovered, the unit cost savings of reduced assessors' time could be substantial" (p. 131).

In an investigation of the decision-making strategies employed by assessors, Sackett and Hakel (1979) found individual differences in assessors' information utilization in reaching overall ratings. After performing a regression analysis on seventeen skill dimensions, they found that
assessors agreed on the importance of the four skill dimensions which accounted for the majority of variance in overall ratings. Assessors had differing perceptions, however, as to the importance of the remaining thirteen skill dimensions. Sackett and Hakel conclude that assessors don't utilize all available information in formulating an overall rating and state, "Given that all dimensions have been identified by the organization as important for managerial success, one possibility would involve taking the final decision out of the hands of the assessors and using the assessors solely to observe and evaluate behavior relevant to the specific dimensions" (p.135).

Sackett and Wilson (1982) investigated the assessor team meeting process to determine if group consensus judgments could be predicted based on prediscussion ratings made by the individual assessors. A simple mechanical decision rule was devised which correctly predicted 94.5% of all ratings made. The authors state "Final ratings for each dimensions can be derived by mechanical combination of individual assessor ratings" (p. 14). They further conclude, "These findings suggest that virtually the same bottom line results could be obtained without going through the consensus process" (p. 15).

Gilbert (1982) correlated two sets of final skill ratings for 40 first level supervisors. One set of ratings were derived via the team meeting process, the other through
mechanical combination. The author obtained an overall correlation of approximately .75 for the two sets of ratings and, for individual skill categories, correlations ranging from a high of .92 for oral communication to a low of .57 for written communications. Gilbert concluded that the two sets of ratings were correlated highly enough to suggest that mechanical data combination might provide a feasible alternative to the team meeting process.

As stated earlier, the research is inconclusive and has produced conflicting results. Korman (1968), Campbell et al. (1962), Moses (1972), and Huck (1974) support a clinical approach in combining behavioral data, while Wollowick & McNamara (1969), Howard (1974), Sackett & Hakel (1979), Sackett & Wilson (1982) and Gilbert (1982) have provided supportive evidence for use of a mechanical mode of data combination. One point, however, remains clear: mechanical combination of behavioral data is an alternative to the team meeting process worthy of further investigation.

Research Objective

This research will investigate the feasibility of utilizing a mechanical model of data combination to formulate overall skill ratings in an assessment center. Mechanically derived skill ratings will be compared to clinically derived skill ratings produced for a group of assessees. Both the mechanical and clinical ratings will be based on the
same behavioral data for each of the assesses. If these
two sets of skill ratings are shown to be equally correlated
to a job performance criterion, justification will have been
provided to support the use of a mechanical mode of data
combination as a viable alternative to the assessor team
meeting process.
METHOD

Subjects
An assessment center was developed to evaluate second-level manager employed at a large service-oriented company. The purpose of the center was to select employees for promotion to third-level management, the target position. Over 100 managers were evaluated in a three day assessment center program. From this group, 40 were randomly selected for use in this study.

Skills Evaluated
A formal job analysis was conducted to determine the duties, tasks, and responsibilities required of the target position. Based on this analysis, nine skills were identified as being critical to successful performance on the job. These skills are: leadership (LD), sensitivity (SN), perception (PC), decision making (DM), decisiveness (DC), organizing and planning (OP), adaptability (AD), oral communication (OC) and written communication (WC). Definitions of these skills are provided in Appendix A.
Simulation Exercises

The job analysis information also identified the types of situations and organizational constraints encountered in the target position. These data were then used in the development of situational exercises. The situations included: an in-basket exercise, a problem solving exercise, a leaderless group discussion exercise, an employee counseling exercise, and a customer service exercise. A summary description of these exercises is provided in Appendix B.

Based on the job analysis, each exercise received a weighting of one, two, or three X's for each skill category. These weightings were judgmentally determined by consultants responsible for the design and development of the simulation exercises. The weightings are an indication of the degree to which each exercise elicits or measures a particular skill. They should not, however, be regarded as a measure of the relative importance of each skill to successful performance in the target position. Again, the weightings reflect the extent to which each exercise measures a given skill. For example, three X's would mean that a given skill was strongly measured in an exercise, whereas one X implies that the skill is measured to a lesser extent. The weightings were illustrated in a skill matrix form: exercises were listed across the top, skills listed along the left-hand side, and weightings were plotted in each of the cells (Appendix C). Assessors were trained to make use of this
matrix when arriving at overall skill ratings during the team meeting.

Assessors

Assessors selected for this program were one to two organizational levels above the assessees. None of the assessors had prior experience with the work performance of those assessees whom they were required to evaluate. Prior to serving in the center, each assessor underwent a five-day assessor training program.

Exercise Evaluations

An assesseee was observed by a different assessor in at least three of the five exercises. The assessor was required to take notes on the assesseee's performance and to document important behaviors observed. The assessor was then required to write an exercise report, in which the behaviors were categorized along skill dimensions and numerical ratings were assigned to each skill category. The ratings ranged from 1-poor to 7-outstanding, with 4 being satisfactory.

Final Skill Ratings

Each assessment center cycle required three days: two days to observe assessees and one day to conduct team meetings for each of the assessees. During the team meeting all
relevant assessment data were reported and discussed. Assessors pooled their judgments and arrived at an overall rating for each skill category. Each team meeting lasted an average of one hour and 30 minutes. Following the team meeting, a designated assessor wrote a final evaluative report summarizing the assessee's performance in the center. At the conclusion of the assessment cycle, each assessee had received six sets of skill ratings: this included one set for each of the five exercises and a set of final skill ratings. Again, the final ratings were arrived at through a judgmental pooling of each assessor's exercise observations. All aspects of the center design and operation were in accordance with established assessment center standards (Adler, 1978; Bray, 1976; Byham, 1980; Task Force on Assessment Center Standards, 1980) and in accordance with governmental guidelines on employee selection (Gorham, 1978; Taylor, 1978).
PROCEDURE

Procedure 1: Derivation of Clinically Combined Ratings

Assessment center data were obtained for 40 second level managers. The data included ratings for nine skills across three to five simulation exercises, some skills were not measured in some exercises. The exercise skill ratings were subjectively combined in the team meeting process to produce nine final skill ratings for each of the the 40 managers.

Procedure 2: Derivation of Mechanically Combined Ratings

Concurrent with the operation of the center, a mathematical formula was developed for the purpose of mechanically combining the individual exercise ratings to arrive at a final overall skill rating. The mathematical formula was based strictly on job analysis data and reflected the weightings assigned to skills for each exercise. The formula derived an average overall rating based on each of the exercise ratings and its corresponding skill weight. These weightings are shown in the skill matrix form presented in Appendix C. For example, an assessee's overall skill rating for decisiveness would be computed using the formula (in-basket skill rating x 2) + (problem solving skill rating x
3) + (employee counseling skill rating x 2) + (customer service skill rating x 1) ÷ 9. In other words, the mathematical formula produces a weighted average where the sum of the products (exercise skill rating x weight) is divided by the sum of the weights. Through this process, an overall rating was computed for each of the 9 skills for all 40 subjects.

Procedure 3: Development of a Criterion

A job performance, or criterion measure, was required to compare mechanical to clinical combined skill ratings. No job performance data were currently available for the subject group of this study and so a performance appraisal form was developed based on the available job analysis data (Appendix D, Performance Survey Analysis). The form takes into account a large number of behavioral statements that have been observed for the target position. The form comprises 85 task statements and makes use of a 5-point scale that denotes the frequency with which a behavior has been observed. For positively phrased task statements (e.g., clearly communicates objectives to subordinates), the rating scale is marked: 1 - Almost Never to 5 - Almost Always. For negatively phrased task statements (e.g., Procrastinates in dealing with poor performers), the scale is benchmarked: 1 - Almost Always to 5 - Almost Never. Thus good performance would be reflected in a high overall score.
Task statements for the Performance Survey Analysis form were clustered into six sub scales: Interaction with subordinates, interaction with peers, interaction with superiors, policy dissemination, general work procedures/activities and client interaction. The form was reviewed by target position incumbents from the host organization to ensure that the task statements were an accurate reflection of activities performed on-the-job. Following this review several slight modifications were made to the form.

The immediate superior for each of the 40 subjects completed a Performance Survey Analysis Form. This provided the criterion measure with which to analyze the mechanical and clinical data combination strategies.

Procedure 4: Factor Analysis of the Criterion Subscale

Once the Performance Survey Analysis had been completed for each of the 40 subjects, the form was factor analyzed with an orthogonal rotation of the six subscales. This determined the number of true independent factors being measured by the subscales.

Procedure 5: Regression Analysis

The primary purpose of this research was to determine if mechanically combined skill ratings are "as good" as the skill ratings produced through the assessment center's team meeting process. In other words, are the mechanically
derived scores as valid as the clinically derived scores in their ability to predict job success? Thus the hypothesis was tested by multiple regression procedures. Specifically, three multiple regression analyses were performed: Clinical variables used as predictors, mechanical variables used as predictors and a combination of clinical and mechanical variables used as predictors, where the total score on the Performance Survey Analysis was used as the criterion to be predicted. The multiple correlations from these regression equations were compared to determine the superiority of one data combination strategy over the other.
RESULTS

Predictor and Criterion Statistics

Means and standard deviations were computed for the nine clinically combined skill ratings and the nine mechanically combined skill ratings (Table 1). The criterion, the Performance Survey Analysis form, was also examined and means and standard deviations were computed for each of its subscales (Table 2).

Although no statistical comparison of the mechanical and clinical mean skill ratings was made in this study, differences between them were very small, the largest being only .236 for the skill of organizing and planning. Mean ratings for the nine skills were found to be highly related and a correlation of .953 ($r^2 = .908$) was obtained between the two sets of ratings.

Intercorrelations of the mechanically combined skill ratings and intercorrelations of the clinically combined skill ratings are presented in matrix form in Table 3. The matrix also lists the correlations between mechanical skill ratings and clinical skill ratings, as well as, the correlations between each skill and the total criterion score.
Factor Analysis of Criterion

A factor analysis was performed on the six subscales of the criterion. The data were analyzed using a principal components factor analysis with orthogonal rotation. Specifically, the Varimax procedure of the Statistical Package for the Social Science (SPSS) program was used to accomplish this. Only one factor emerged with an Eigenvalue greater than 1. The Performance Survey Analysis form was measuring only one general job performance variable and thus supporting use of the overall criterion score for all regression analyses. The results of this analysis are presented in Table 4.

Factor Analysis of Predictors

The sets of mechanical and clinical skill ratings were factor analyzed to determine what effect the mode of data combination had on the factor structure of the predictor scales. Again, the SPSS Varimax procedure was used. The set of clinical and mechanical skill ratings each produced two factors with Eigenvalues greater than 1. The factor matrices for the two clinical and two mechanical factors are presented in Table 5 and 6.

Similarity coefficients were computed to determine the relationship between the clinical and mechanical factors (Barlow & Burt, 1954; Shirkey, 1982). It was found that mechanical factor 1 was virtually identical to clinical
factor 2 and that mechanical factor 2 was equally similar to clinical factor 1. The similarity between mechanical factor 1 and clinical factor 1 and mechanical 2 and clinical factor 2 was considerably lower (Table 7). These results indicate that the clinical and mechanical methods of data combination provided similar factor structures for the predictor scales.

Regression Analysis

Using the SPSS program, two stepwise regression equations were computed to predict the overall criterion score from the assessment center skill ratings. One equation used the clinically combined scores as predictors, while the other used the mechanically combined scores. The clinical scores yielded a squared multiple correlation coefficient \( R^2 \) of .270 (Table 8) and the following regression equation:

\[
\text{Predicted Overall Criterion Score} = 18.591 \ (OP) - 12.740 \ (AD) + 13.904 \ (PC) - 4.911 \ (OC) + 6.351 \ (DC) - 6.092 \ (DM) - 1.619 \ (WC) + 262.916.
\]

The skill dimensions of Leadership and Sensitivity were excluded from the regression equation. The computed F ratios for these two skills (the F value which would have been obtained had the variables been included in the equation) were approximately .001 (Table 9). This is considerably less than the .01 minimum required by the SPSS program for a variable to be included in a stepwise regression equation.
The mechanical scores produced an $R^2$ of .306 from the following regression equation:

$$\text{Predicted Overall Criterion Score} = 27.677 \text{ (OP)} - 20.847 \text{ (AD)} + 12.319 \text{ (PC)} - 6.209 \text{ (WC)} - 8.704 \text{ (DC)} + 11.568 \text{ (LD)} - 9.312 \text{ (DM)} + 4.731 \text{ (SN)} - 2.798 \text{ (OC)} + 291.102.$$  

With the mechanically combined ratings, all 9 skills were used in the regression equation. Summary tables of the multiple regression analysis for clinical and mechanical skill ratings are presented in Tables 8 and 10.

**Comparison of Regression Equations**

A multiple regression equation was calculated using eighteen variables: the nine clinically combined ratings and the nine mechanically combined ratings. The stepwise multiple regression equation used seventeen of the eighteen variables; written communications - clinical was excluded because it failed to meet the minimum $F$ value for inclusion (Table 12). The combination of mechanical and clinical variables produced an $R^2$ of .485 (Table 11). This $R^2$ was compared to the $R^2$ generated for the mechanical and clinical regression equations to determine if the addition of nine variables to either equation would add significantly to prediction.

An $F$ test was conducted to make the following comparisons:
1. $R^2$ for clinical variables with $R^2$ for clinical and mechanical variables.

2. $R^2$ for mechanical variables with $R^2$ for clinical and mechanical variables.

Using a procedure outlined by Kerlinger and Pedhazur (1973), an F ratio of .917 with 9 and 12 degrees of freedom was obtained for a comparison of the $R^2$ generated for the clinical variables. An F value of .957 with 8 and 22 degrees of freedom was obtained for a comparison with the $R^2$ generated for the mechanical variables. Neither F value was significant at the .01 or .05 level of significance. Thus, the $R^2$ for a combination of mechanical and clinical variables was not significantly larger than the $R^2$ for mechanical variables or the $R^2$ for clinical variables.

It was shown that addition of mechanical variables to the clinical regression equation, or the addition of clinical variables to the mechanical regression equation would not significantly increase the $R^2$. Therefore, it was concluded that both regression equations were approximately equivalent in their ability to predict performance on the criterion measure.
DISCUSSION

The results of this study support the author's initial hypothesis: Final skill ratings derived through mechanical combination were not statistically different from final skill ratings derived through clinical combination. Both sets of skill ratings were approximately equal in their ability to predict a criterion of job success. These findings are similar to those obtained by Huck (1974), Mitchell (1975), Moses (1972), and Wollowick and McNamara (1969). Each of these studies compared a mechanical combination of assessment center variables to clinical combination by correlating some type of overall assessment center rating to a criterion of job success. Huck, Moses, and Mitchell found the two methods approximately equal in their ability to predict a criterion measure. However, they chose to support continued use of the team meeting process under the premise that the superiority of mechanical combination clearly had not been demonstrated. Wollowick and McNamara, on the other hand, found mechanical combination to be superior, and suggested that deriving overall ratings through some type of statistical procedures might increase an assessment center's predictive validity.
It should be emphasized that these studies focused on the combination of final skill ratings to derive an overall assessment rating. It is in this regard that the present research represents a significant departure from previous work; it focuses not on the combination of independent skill ratings but on the combination of exercise ratings to derive final skill ratings.

For example, in the traditional assessment center, a participant's skill performance is observed and evaluated in several simulation exercises. During the team meeting, these evaluations are judgmentally combined to derive a final rating for each skill dimension. In many instances the assessors are then required to combine the final skill ratings to produce an overall assessment rating. This overall assessment rating serves as a single numerical index of the participant's overall performance.

The aforementioned research has investigated deriving this overall assessment rating through mechanical combination rather than the team meeting. The more important issue, however, concerns the initial combination of data in the formulation of final skill ratings.

The overall assessment rating is a convenient index with which to prioritize candidates for a position or perform other personnel functions. However, given that each skill has been assumed to be an independent dimension and
critical to successful job performance, it does not seem reasonable to arbitrarily combine them to form one crude numerical rating of potential ability. The formulation of an overall assessment rating negates the painstaking process of carefully observing and categorizing behaviors to arrive at independent skill evaluations. Overall assessment ratings are not indigenous to all assessment centers and, though they have been shown to be valid predictors of job performance, their use is questioned by many practitioners. For these reasons, the formulation of final skill ratings is an area in need of additional research. It represents a function of data combination that is both necessary and desirable and, unlike the overall assessment rating, is a vital and integral part of all assessment centers.

Recently, some research has been conducted which did examine the formulation of final skill ratings. As was mentioned earlier, Sackett and Wilson (1982) devised a "decision rule" which correctly predicted 96.5% of all final ratings made through assessor team meetings. They concluded that mechanical combination of individual assessor ratings provided virtually the same results that had been obtained through the assessor team meeting. Gilbert (1982) obtained high correlations between ratings generated through the assessor team meeting and ratings derived through mechanical combination. He concluded that the correlations were high enough to suggest that mechanical data combination might be
a feasible alternative to the team meeting process, but that
in the absence of an external job criterion, no statements
regarding the superiority of either method could be made.
Both studies sought to demonstrate that mechanical combina-
tion of final skill ratings could produce essentially the
same results as the assessor team meeting process. Neither
study, however, sought to substantiate the superiority of
one method over the other. Rather, their emphasis was to
demonstrate that both combination strategies could produce
equivalent results.

In contrast to these studies, which also focused on the
formulation of final skill ratings, the present research
made use of a job performance criterion. This not only
established the validity of both sets of skill ratings, but
allowed for a comparison of the two data combination stra-
tegies. A multiple correlation of .52 ($R^2 = .27$) was ob-
tained for the clinically combined skills and of .55
($R^2 = .30$) for the mechanically combined skills. The
difference between correlations was not significant. It was
shown for this set of data that both options produced
approximately the same results.

To further compare clinical and mechanical combination,
the job performance criterion was regressed on a combination
of the clinically combined and mechanically combined skill
ratings, producing a multiple correlation of .696
($R^2 = .485$). It was shown that the multiple correlation
generated for the combination of clinical and mechanical variables was not significantly larger than the multiple correlation of either the clinical or mechanical variables alone. The clinically combined skills did not predict a significantly greater amount of unique criterion variance than the mechanically combined scores alone. In other words, addition of the nine clinical variables into the regression equation did not significantly increase prediction of the criterion. This suggests that the mechanically combined skills and the clinically combined skills were approximately equal in their predictive validity.

It is interesting to note that seven of the first nine variables entered into the eighteen variable regression equation were mechanically combined ratings. Although it cannot be concluded from this analysis that one set of ratings was superior to the other, it appears that if one is limited to nine variables, it would be desirable to use the mechanically combined skill ratings rather than the clinically combined ratings.

Another point worth noting concerns the pattern of simple correlations between the skill dimensions and the criterion. For both methods of combination, organizing and planning was the skill most highly correlated with the criterion, followed by perception and decision making. And in the stepwise regression equations computed for each combination strategy, the skills of organizing and planning,
adaptability and perception were entered as first, second and third variables. For both equations these three variables accounted for over 25% of the criterion variance and only minor increases in prediction were gained by inclusion of the remaining six skill variables into the equation (i.e., $R^2 = 0.27$ for clinical, and $R^2 = 0.30$ for mechanical).

An examination of descriptive statistics provided additional evidence to suggest that the two processes were equivalent. Means and standard deviations were found to be very similar for the mechanically combined and clinically combined skills. Mean ratings were found to be highly correlated between both sets of skills and over 90% of the variance for one set of skill means could be predicted from knowledge of the other.

It was also interesting to note that a factor analysis of skill ratings generated two virtually identical factors for both data combination strategies. One factor could be labeled Interactive Ability and the other Cognitive Ability. With the clinically combined data, the skills of Sensitivity, Oral Communication, and Adaptability loaded heavily on the Interactive Factor. The skills of Leadership, Perception, Decision Making, Organizing and Planning, and Written Communication loaded heavily on the Cognitive Factor. The skill of Decisiveness loaded equally on both factors. With the mechanically combined data, the skills of Perception, Decision Making, Organizing and Planning, and
Written Communication loaded heavily on the Cognitive Factor. The skills of Leadership, Sensitivity, Oral Communication, and Adaptability loaded on the Interactive Factor. Again, the skill of Decisiveness loaded equally on both factors. The only difference between the clinical and mechanical factor loadings concerned the skill of Leadership. It appears that in the team meeting, assessors regard the skill of Leadership as a cognitive variable; whereas through mechanical combination, Leadership is regarded as more of an interactive variable. Despite this difference, the two Interactive Factors and the two Cognitive Factors were statistically similar to each other. The factor structure of the predictor scales, was essentially the same for both data combination strategies. This would suggest that the mathematical formula employed to arrive at skill ratings closely approximates the consensus discussion which occurred during the assessor team meeting. This provides additional evidence to indicate that both combination strategies are equivalent processes. Because of the small sample, however, care should be taken in extrapolating from the results of this factor analysis.
CONCLUSIONS

This study was unique in two regards: 1) It examined the formulation of final skill ratings rather than the overall assessment rating and 2) It validated each set of skill ratings with a job performance measure, thereby allowing for a comparison of the two data combination strategies. It was demonstrated that final skill ratings generated through mechanical combination were equivalent to clinically combined skill ratings in their ability to predict performance on a job criterion.

For this study, the mechanical combination equation was based on exercise skill weightings which were determined by consultants experienced in job analysis and assessment center activities. It may be possible to improve prediction by statistically determining weights for the mechanical equation instead of relying on the subjective judgment of a job analysis. Future research should attempt to establish an empirical criterion for determining exercise weightings to be used in the mechanical formula.
Cost Advantages of Mechanical Combination

The results provide strong support for taking the data combination function out of the assessors' hands. Data collection, out of necessity, will remain a "clinical" activity and, therefore, not an area of possible cost reduction. However, the process of combining data via the assessor team meeting, is one aspect of the assessment center which could be effectively modified to reduce the time and cost associated with operation. As noted earlier, the assessor team meeting encompasses roughly 1/3 of the total time required to run an assessment center cycle. The advantages of combining data mechanically as opposed to the team meeting are considerable. Elimination of the team meeting would reduce by a third the indirect costs of assessor salaries and lost time on the job, as well as the direct costs associated with maintaining the assessment center facilities. Although harder to quantify in terms of cost savings, there is also the advantage of being able to assess a greater number of participants in a shorter amount of time. For example, by reducing the length of an assessment center from three days to two, three cycles could be conducted per week instead of two.

Elimination of the Team Meeting

There is a predisposition among assessment center practitioners to support continued use of the assessor team
meeting because of its alleged benefits in reducing rating errors, thereby increasing validity. During the team meeting, assessors scrutinize each other's exercise reports and may correct such errors as misclassification of observations, inappropriate weighting of behaviors and assignment of overly high or low ratings to skill evaluations. Thus consensus is reached on a set of skill ratings which are sensitive to the nuances of effective and ineffective managerial behavior. The supposition is that the team meeting process generates more valid predictors of true skill abilities than what might have resulted had the consensus discussion not taken place.

This premise has yet to be empirically proven. It could possibly be argued that a group of extremely well-trained and experienced assessors would promote the benefits earlier described, but even this is a point of conjecture. Furthermore, the typical assessor team is not composed of an experienced well-trained staff; assessor training typically ranges from three to five days and assessors may serve four times a year or less. Given the typical composition of the assessor team, it would not seem prudent to automatically regard the assessor team meeting as a validity enhancing component of the assessment process. Yet most practitioners currently view any departure from the team meeting as an unacceptable compromise of the assessment center process. The results of this research do not support this supposition.
Future research should continue to compare these two data combination strategies and investigate methods of increasing predictive validity by empirically determining exercise weightings for use in the mechanical combination formula. Other methods of enhancing assessment center efficiency should also be investigated, such as reducing the length and/or number of simulation exercises and empirically determining the optimum number of skills to be evaluated. The results of this study have established support for use of a mechanical combination procedure over the team meeting process.
APPENDICES
APPENDIX A

ASSESSMENT CENTER SKILL DEFINITIONS

Leadership - Ability to take charge; to direct and coordinate the activities of others; to maintain control of situations and others; to achieve results through delegation and follow-up.

Sensitivity - Ability to be sensitive to the needs and feelings of others; to develop rapport and trust; to accept interpersonal difference, to deal effectively with others regardless of level or status.

Perception and Analysis - Ability to identify, assimilate and comprehend the critical elements of a situation; to extract and interpret implications of courses of action; to attend to details of a problem (includes both data and people related issues).

Decision Making - Ability to use logical and sound judgment in choosing a particular course of action; to generate and evaluate alternative courses of action (this refers to the quality as opposed to the quantity of decisions).
Decisiveness - Ability to take action when called upon to do so (quantity of decisions); and to defend decisions when challenged.

Organizing and Planning - Ability to systematically structure tasks, plans and objectives; to establish priorities and set goals, to classify and categorize information.

Adaptability - Ability to alter normal posture with presentation of additional information; to appropriately change courses of action dictated by changes in the situation; to have the ability to behave in more than one way in a given situation; to adapt to stressful situations.

Oral Communication - Ability to effectively and clearly present and express information orally, in both formal and informal situations.

Written Communication - Ability to present and express information effectively and clearly through written means.
APPENDIX B

SUMMARY EXERCISE OVERVIEWS

In-Basket

A one and one-half hour individual task in which the participant is asked to assume the position of a branch manager within a large credit card firm. The participant is asked to process and respond to a large number of accumulated memos, letters, and other correspondence which vary in their importance and urgency. All actions taken, directions/instructions given other members of the hypothetical organization, etc., must be in the form of written memos or letters. After the completion of the one and one-half hour time period, a 20 minute interview is conducted to allow for clarification/explanation of the actions taken by the participant.

Problem Solving

A one hour individual task followed by a 20 minute oral presentation to two assessors. In this exercise, the participant individually analyzes data regarding two possible alternatives for improving the profitability of Elite Credit Card Company. At the end of the one hour period, the participant has prepared a written statement of his/her
recommendation with supporting reasoning for decisions made. The participant then presents the recommendations to two assessors; one of whom is critical of the participant's recommendation, while the other is noncommittal and essentially passive.

**Leaderless Group Discussion**

A one hour and 20 minute exercise, 20 minutes of which is spend individually analyzing data in preparation for the group meeting, one hour being spent in a group discussion exercise. The task involves preparing a group recommendation, reached by consensus of opinion, regarding which of several client services should or should not be discontinued in order to reduce company expenditures. During the individual analysis period, the participant analyzes the data in preparation for the ensuing group discussion.

**Employee Counseling Exercise**

A one hour exercise consisting of a 30 minute individual review period, and a 30 minute meeting with a problem employee. In the review period, the participant reviews information pertinent to employee's past performance as well as the employee's recent performance decline. During the meeting with the employee, the employee in his/her role attempts to minimize, as well as rationalize the problems.
Customer Service Exercise

A 40 minute exercise, 20 minutes of which is spent preparing for an upcoming meeting with a representative for an important client. The task involves discussing with the representative "some problems" which are not as of yet clear. During the individual analysis period, the participant analyzes the data in preparation for the ensuing face-to-face discussion.
APPENDIX C

SKILL MATRIX SHEET

<table>
<thead>
<tr>
<th>Skill Dimension</th>
<th>In-Basket</th>
<th>Problem Solving</th>
<th>Employee Counseling</th>
<th>L.G.D.</th>
<th>Customer Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>XX</td>
<td>N/A</td>
<td>XXX</td>
<td>XX</td>
<td>N/A</td>
</tr>
<tr>
<td>Perception</td>
<td>XX</td>
<td>XXX</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
<td>XX</td>
<td>XXX</td>
</tr>
<tr>
<td>Decisiveness</td>
<td>XX</td>
<td>XXX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Decision Making</td>
<td>XXX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Organizing and Planning</td>
<td>XXX</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>Written Communication</td>
<td>XX</td>
<td>XXX</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Adaptability</td>
<td>N/A</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
</tbody>
</table>

XXX = Very Strongly Measured
XX = Strongly Measured
X = Measured
APPENDIX D

PERFORMANCE SURVEY ANALYSIS FORM

Rater: _____________________________ Position: _____________________________

Ratee: _____________________________ Position: _____________________________

INSTRUCTIONS

The following form is a performance survey analysis which has been designed for the position of manager.

This form takes into account a large number of behavioral statements that have been observed for the job in question. The form makes use of a 5-point behavioral observation scale which denotes the frequency with which a behavior has been observed to occur. You are to rate the target position incumbent as to the frequency with which he/she engages in each of the behaviors.

Read each behavior and its scale carefully and circle the number which corresponds most closely to your judgment of that person's behavior. A rating of 3 would denote that the person engages in the behavior frequently enough to satisfactorily perform his/her job.
A. Interaction with Subordinates

1. Keeps informed of significant events by subordinates.
   Almost Never 1 2 3 4 5 Almost Always

2. Resolves issues which can't be handled by subordinates.
   Almost Never 1 2 3 4 5 Almost Always

3. Interfaces with staff to establish functional area's needs (e.g., budget, manpower).
   Almost Never 1 2 3 4 5 Almost Always

4. Monitors completion of tasks assigned to subordinates.
   Almost Never 1 2 3 4 5 Almost Always

5. Ensures proper functioning of clerical staff.
   Almost Never 1 2 3 4 5 Almost Always

6. Appropriately delegates work to correct subordinates.
   Almost Never 1 2 3 4 5 Almost Always

7. Reviews recommendations/suggestions of subordinates.
   Almost Never 1 2 3 4 5 Almost Always

8. Counsels supervisory personnel on a continuing basis to discuss problems.
   Almost Never 1 2 3 4 5 Almost Always

9. Monitors completion of reports and records for accuracy and completeness.
   Almost Never 1 2 3 4 5 Almost Always
10. Provides coordination on projects assigned to subordinates.
   Almost Never  1 2 3 4 5  Almost Always

11. Assists subordinates in solving problems.
   Almost Never  1 2 3 4 5  Almost Always

12. Successfully resolves problems with subordinates.
   Almost Never  1 2 3 4 5  Almost Always

13. Clearly communicates objectives to subordinates.
   Almost Never  1 2 3 4 5  Almost Always

   Almost Never  1 2 3 4 5  Almost Always

15. Communicates measurable/observable standards against which subordinate performance can be evaluated.
   Almost Never  1 2 3 4 5  Almost Always

16. Procrastinates in dealing with poor performers.
   Almost Always  1 2 3 4 5  Almost Never

17. Holds subordinates accountable for technical competency.
   Almost Never  1 2 3 4 5  Almost Always

18. Makes self accessible to subordinates.
   Almost Never  1 2 3 4 5  Almost Always
19. Delegates responsibility commensurate with the authority of subordinates.

Almost Never 1 2 3 4 5 Almost Always

20. Holds appropriate subordinates accountable for training their employees.

Almost Never 1 2 3 4 5 Almost Always

21. Renders advice, guidance, and counsel to subordinates.

Almost Never 1 2 3 4 5 Almost Always

22. Engages in activities designed to motivate subordinates, improve morale and decrease turnover.

Almost Never 1 2 3 4 5 Almost Always

23. Implements/engages in training activities designed to enable subordinates to attain required skill levels for office operation.

Almost Never 1 2 3 4 5 Almost Always

24. Performs work activities that should be delegated to others.

Almost Always 1 2 3 4 5 Almost Never

25. Treats all employees in a fair, consistent, uniform manner (does not show favoritism).

Almost Never 1 2 3 4 5 Almost Always

26. Meets employees' office supply and/or equipment needs in a timely manner.

Almost Never 1 2 3 4 5 Almost Always

27. Provides subordinates with specific details, descriptions of assigned tasks, responsibilities.

Almost Never 1 2 3 4 5 Almost Always
28. Assists subordinates when they fall behind in their work.
   Almost Never 1 2 3 4 5 Almost Always

29. Consults employees on ideas on ways to improve their work situation.
   Almost Never 1 2 3 4 5 Almost Always

30. Solicits ideas from employees on improving operations and/or promoting business.
   Almost Never 1 2 3 4 5 Almost Always

31. Recognizes/acknowledges others' viewpoints.
   Almost Never 1 2 3 4 5 Almost Always

32. Praises subordinates' for job well done.
   Almost Never 1 2 3 4 5 Almost Always

33. Criticizes an employee in front of others.
   Almost Always 1 2 3 4 5 Almost Never

Total Score = ______

B. Interactions with Peers

1. Invites input from peers on issues which will directly affect them.
   Almost Never 1 2 3 4 5 Almost Always

2. Is open and non-defensive to questions and criticisms of peers.
   Almost Never 1 2 3 4 5 Almost Always
3. Devotes time toward learning about peers' ongoing operations (e.g., projects, deadlines, interrelationships of goals and objectives).

| Almost Never | 1 | 2 | 3 | 4 | 5 | Almost Always |

4. Engages in activities designed to promote harmonious interdepartmental working relationships.

| Almost Never | 1 | 2 | 3 | 4 | 5 | Almost Always |

5. Encourages candid comments from peers (e.g., not offended by statements of others).

| Almost Never | 1 | 2 | 3 | 4 | 5 | Almost Always |

6. Acknowledges the expertise of personnel from other departments/specialities.

| Almost Never | 1 | 2 | 3 | 4 | 5 | Almost Always |

Total Score =

C. Interactions with Superiors

1. Keeps superior informed of his/her actions.

| Almost Never | 1 | 2 | 3 | 4 | 5 | Almost Always |

2. Secures appropriate approvals prior to implementing actions.

| Almost Never | 1 | 2 | 3 | 4 | 5 | Almost Always |

3. Informs superiors immediately when equipment/personnel needs emerge.

| Almost Never | 1 | 2 | 3 | 4 | 5 | Almost Always |

4. Regularly monitors physical facilities to detect conditions which could adversely affect operations.

| Almost Never | 1 | 2 | 3 | 4 | 5 | Almost Always |
5. Assists superiors in preparation of salary/expense budget and management reports to ensure their accurate and timely completion.

Almost Never 1 2 3 4 5 Almost Always

6. Keeps superiors informed of major changes in area of operational responsibility.

Almost Never 1 2 3 4 5 Almost Always

7. Provides unrequested data that are of assistance to superiors.

Almost Never 1 2 3 4 5 Almost Always

Total Score =

D. Policy Dissemination

1. Interprets company policy to subordinates.

Almost Never 1 2 3 4 5 Almost Always

2. Correctly interprets procedural guidelines of work operations.

Almost Never 1 2 3 4 5 Almost Always

3. Provides a clear explanation of rules and regulations to employees.

Almost Never 1 2 3 4 5 Almost Always

4. States organization's position/policies non-defensively.

Almost Never 1 2 3 4 5 Almost Always

5. Explains rationale behind directives, decisions, and policies that may affect others.

Almost Never 1 2 3 4 5 Almost Always
6. Clearly describes details of a change in policy and procedures.

Almost Never  1  2  3  4  5  Almost Always

Total Score =

E. General Work Procedures/Activities

1. Conducts staff meetings when need exists (e.g., procedural change, project status update, etc.)

Almost Never  1  2  3  4  5  Almost Always

2. Meets departmental or division goals.

Almost Never  1  2  3  4  5  Almost Always

3. Efficiently enters and/or retrieves data from computer/teleprocessing equipment.

Almost Never  1  2  3  4  5  Almost Always

4. Is slow to respond to requests for information.

Almost Always  1  2  3  4  5  Almost Never

5. Identifies and collects data required for completion of reports and/or tasks.

Almost Never  1  2  3  4  5  Almost Always

6. Establishes priorities on a timely basis.

Almost Never  1  2  3  4  5  Almost Always

7. Recognizes when does not know answer to operational question.

Almost Never  1  2  3  4  5  Almost Always
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>Actively participates during group discussion (e.g., staff meetings, brainstorming session).</td>
</tr>
<tr>
<td></td>
<td>Almost Never 1 2 3 4 5 Almost Always</td>
</tr>
<tr>
<td>9.</td>
<td>During talks with others, keeps discussion on topic at hand (i.e., avoids tangential issues).</td>
</tr>
<tr>
<td></td>
<td>Almost Never 1 2 3 4 5 Almost Always</td>
</tr>
<tr>
<td>10.</td>
<td>Generates innovative ways/methods of handling new or ongoing problems.</td>
</tr>
<tr>
<td></td>
<td>Almost Never 1 2 3 4 5 Almost Always</td>
</tr>
<tr>
<td>11.</td>
<td>Establishes goals that are difficult but attainable.</td>
</tr>
<tr>
<td></td>
<td>Almost Never 1 2 3 4 5 Almost Always</td>
</tr>
<tr>
<td>12.</td>
<td>Establishes realistic timetables for achievement of goals.</td>
</tr>
<tr>
<td></td>
<td>Almost Never 1 2 3 4 5 Almost Always</td>
</tr>
<tr>
<td>13.</td>
<td>Identifies problems that may affect work area operations.</td>
</tr>
<tr>
<td></td>
<td>Almost Never 1 2 3 4 5 Almost Always</td>
</tr>
<tr>
<td>14.</td>
<td>Develops broad overall strategy statements for work area that define long range objectives.</td>
</tr>
<tr>
<td></td>
<td>Almost Never 1 2 3 4 5 Almost Always</td>
</tr>
<tr>
<td>15.</td>
<td>Measures/monitors success of work area against established area and overall organizational standards.</td>
</tr>
<tr>
<td></td>
<td>Almost Never 1 2 3 4 5 Almost Always</td>
</tr>
<tr>
<td>16.</td>
<td>Develops ways of incorporating/integrating company programs and objectives with those of own work area.</td>
</tr>
<tr>
<td></td>
<td>Almost Never 1 2 3 4 5 Almost Always</td>
</tr>
</tbody>
</table>
17. Establishes measures (criteria) for evaluating the efficiency of work area.

   Almost Never  1 2 3 4 5  Almost Always

18. Achieves technical competency in areas required for own job functions.

   Almost Never  1 2 3 4 5  Almost Always

19. Successfully performs duties of superior in superior's absence.

   Almost Never  1 2 3 4 5  Almost Always

20. Correctly identifies discrepancies/mistakes in written data, budgets, reports, etc. that come under his/her review.

   Almost Never  1 2 3 4 5  Almost Always

21. Quickly makes required decisions when called upon to do so.

   Almost Never  1 2 3 4 5  Almost Always

22. During oral presentations, presents information in a clear and concise manner.

   Almost Never  1 2 3 4 5  Almost Always

23. Readily adapts to changing situations in work environment.

   Almost Never  1 2 3 4 5  Almost Always

24. Allows pressures of job to adversely affect own work activities.

   Almost Always  1 2 3 4 5  Almost Never
25. Submits pertinent inputs for inclusion in upcoming budgets.

Almost Never  1  2  3  4  5  Almost Always

26. Ensures that subordinates are paid a salary commensurate with their performance and job responsibilities.

Almost Never  1  2  3  4  5  Almost Always

27. Is able to establish priorities on a daily basis.

Almost Never  1  2  3  4  5  Almost Always

Total Score = ______

F. Client Interaction

1. Authorizes reimbursements to members and check cashing by member when appropriate.

Almost Never  1  2  3  4  5  Almost Always

2. Resolves daily problems with members to mutual satisfaction of member and ACM.

Almost Never  1  2  3  4  5  Almost Always

3. Modifies own behavior to appropriately deal with members of diverse personalities and needs.

Almost Never  1  2  3  4  5  Almost Always

4. Interacts with members in a friendly, polite and attentive manner.

Almost Never  1  2  3  4  5  Almost Always
5. Makes members comfortable through casual conversation, asking questions of interest, etc.

Almost Never 1 2 3 4 5 Almost Always

6. Responds with hostility or defensiveness when receiving a complaint.

Almost Always 1 2 3 4 5 Almost Never

Total Score = _____
TABLES
**TABLE 1**

Means and Standard Deviations for Clinically and Mechanically Combined Skill Ratings

<table>
<thead>
<tr>
<th>Skill Dimension</th>
<th>Mean*</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>4.050</td>
<td>(4.150) 1.0365 (1.0990)</td>
</tr>
<tr>
<td>Perception and Analysis</td>
<td>4.475</td>
<td>(4.562) .9869 (1.0265)</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>4.650</td>
<td>(4.688) .9213 (.9036)</td>
</tr>
<tr>
<td>Decisiveness</td>
<td>5.050</td>
<td>(4.988) .9044 (.9370)</td>
</tr>
<tr>
<td>Decision Making</td>
<td>4.100</td>
<td>(4.150) .9819 (.9949)</td>
</tr>
<tr>
<td>Organizing and Planning</td>
<td>4.425</td>
<td>(4.162) 1.0834 (1.0300)</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>5.025</td>
<td>(5.050) .8912 (.9044)</td>
</tr>
<tr>
<td>Written Communication</td>
<td>4.850</td>
<td>(4.900) 1.2310 (1.2770)</td>
</tr>
<tr>
<td>Adaptability</td>
<td>4.650</td>
<td>(4.612) .8638 (.8281)</td>
</tr>
</tbody>
</table>

* Numbers in parentheses indicate means and standard deviations for mechanically combined ratings.

Note. n= 40
TABLE 2

Means and Standard Deviations for Total Criterion and Subscales

<table>
<thead>
<tr>
<th>Criterion Subscale*</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Criterion (85-425)</td>
<td>322.725</td>
<td>46.683</td>
</tr>
<tr>
<td>Interaction with Subordinates (33-165)</td>
<td>124.900</td>
<td>18.558</td>
</tr>
<tr>
<td>Interaction with Peers (6-30)</td>
<td>21.650</td>
<td>4.023</td>
</tr>
<tr>
<td>Interaction with Superiors (7-35)</td>
<td>27.375</td>
<td>5.182</td>
</tr>
<tr>
<td>Policy Dissemination (6-30)</td>
<td>23.425</td>
<td>5.109</td>
</tr>
<tr>
<td>General Work Procedures (27-135)</td>
<td>103.275</td>
<td>16.032</td>
</tr>
<tr>
<td>Client Interaction (6-30)</td>
<td>24.100</td>
<td>4.284</td>
</tr>
</tbody>
</table>

Note n= 40

* Numbers in parentheses indicate the minimum and maximum scores possible for each category.
TABLE 3

Correlation Matrix for Skill Ratings and Total Criterion Score

<table>
<thead>
<tr>
<th>Criterion</th>
<th>LDC</th>
<th>PCC</th>
<th>SNC</th>
<th>DCC</th>
<th>DMC</th>
<th>OPC</th>
<th>OCC</th>
<th>WCC</th>
<th>ADC</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDC</td>
<td>1.000</td>
<td>.237</td>
<td>.369</td>
<td>.155</td>
<td>.279</td>
<td>.318</td>
<td>.427</td>
<td>-.003</td>
<td>.206</td>
</tr>
<tr>
<td>PCC</td>
<td>.237</td>
<td>1.000</td>
<td>.553</td>
<td>.422</td>
<td>.599</td>
<td>.726</td>
<td>.619</td>
<td>.443</td>
<td>.368</td>
</tr>
<tr>
<td>SNC</td>
<td>.369</td>
<td>.553</td>
<td>1.000</td>
<td>.498</td>
<td>.489</td>
<td>.664</td>
<td>.574</td>
<td>.278</td>
<td>.398</td>
</tr>
<tr>
<td>DCC</td>
<td>.155</td>
<td>.422</td>
<td>.498</td>
<td>1.000</td>
<td>.391</td>
<td>.436</td>
<td>.461</td>
<td>.448</td>
<td>-.002</td>
</tr>
<tr>
<td>DMC</td>
<td>.279</td>
<td>.726</td>
<td>.664</td>
<td>.436</td>
<td>1.000</td>
<td>.716</td>
<td>.527</td>
<td>.412</td>
<td>.053</td>
</tr>
<tr>
<td>OPC</td>
<td>.318</td>
<td>.619</td>
<td>.574</td>
<td>.461</td>
<td>.527</td>
<td>1.000</td>
<td>.682</td>
<td>.378</td>
<td>.352</td>
</tr>
<tr>
<td>OCC</td>
<td>.427</td>
<td>.619</td>
<td>.574</td>
<td>.461</td>
<td>.527</td>
<td>.682</td>
<td>1.000</td>
<td>.307</td>
<td>.434</td>
</tr>
<tr>
<td>WCC</td>
<td>-.003</td>
<td>.443</td>
<td>.278</td>
<td>.448</td>
<td>.412</td>
<td>.378</td>
<td>.307</td>
<td>1.000</td>
<td>.120</td>
</tr>
<tr>
<td>ADC</td>
<td>.206</td>
<td>.368</td>
<td>.396</td>
<td>-.002</td>
<td>.053</td>
<td>.352</td>
<td>.434</td>
<td>.120</td>
<td>1.000</td>
</tr>
<tr>
<td>LDM</td>
<td>.032</td>
<td>.478</td>
<td>.441</td>
<td>.583</td>
<td>.351</td>
<td>.345</td>
<td>.437</td>
<td>.511</td>
<td>.022</td>
</tr>
<tr>
<td>PCM</td>
<td>.289</td>
<td>.871</td>
<td>.453</td>
<td>.458</td>
<td>.611</td>
<td>.675</td>
<td>.634</td>
<td>.519</td>
<td>.226</td>
</tr>
<tr>
<td>SNM</td>
<td>.399</td>
<td>.599</td>
<td>.894</td>
<td>.403</td>
<td>.563</td>
<td>.655</td>
<td>.563</td>
<td>.320</td>
<td>.424</td>
</tr>
<tr>
<td>DCM</td>
<td>.189</td>
<td>.482</td>
<td>.444</td>
<td>.928</td>
<td>.443</td>
<td>.498</td>
<td>.532</td>
<td>.472</td>
<td>.026</td>
</tr>
<tr>
<td>DMM</td>
<td>.234</td>
<td>.542</td>
<td>.395</td>
<td>.307</td>
<td>.924</td>
<td>.684</td>
<td>.447</td>
<td>.353</td>
<td>.087</td>
</tr>
<tr>
<td>OPM</td>
<td>.342</td>
<td>.776</td>
<td>.644</td>
<td>.450</td>
<td>.704</td>
<td>.942</td>
<td>.748</td>
<td>.386</td>
<td>.375</td>
</tr>
<tr>
<td>WCM</td>
<td>.136</td>
<td>.489</td>
<td>.346</td>
<td>.452</td>
<td>.373</td>
<td>.298</td>
<td>.396</td>
<td>.953</td>
<td>.214</td>
</tr>
<tr>
<td>ADM</td>
<td>.220</td>
<td>.391</td>
<td>.446</td>
<td>.013</td>
<td>.093</td>
<td>.397</td>
<td>.439</td>
<td>.137</td>
<td>.985</td>
</tr>
<tr>
<td></td>
<td>.066</td>
<td>.456</td>
<td>.435</td>
<td>.523</td>
<td>.386</td>
<td>.364</td>
<td>.503</td>
<td>.482</td>
<td>-.058</td>
</tr>
</tbody>
</table>

Note. LD = Leadership  DC = Decisiveness  OC = Oral Comm.
PC = Perception  DM = Decision Making  WC = Written Comm.
SN = Sensitivity  OP = Organizing and Planning  AD = Adaptability

C denotes clinically combined skill ratings.
M denote mechanically combined skill ratings.
### CORRELATION MATRIX FOR SKILL RATINGS AND TOTAL CRITERION SCORE

<table>
<thead>
<tr>
<th></th>
<th>LDM</th>
<th>PCM</th>
<th>SNM</th>
<th>DCM</th>
<th>DMM</th>
<th>OPM</th>
<th>OCM</th>
<th>WCM</th>
<th>ADM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criterion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDC</td>
<td>.289</td>
<td></td>
<td></td>
<td>.234</td>
<td>.342</td>
<td>.458</td>
<td>.136</td>
<td>.220</td>
<td>.066</td>
</tr>
<tr>
<td>PCC</td>
<td>.871</td>
<td>.599</td>
<td>.482</td>
<td>.542</td>
<td>.776</td>
<td>.594</td>
<td>.489</td>
<td>.391</td>
<td>.456</td>
</tr>
<tr>
<td>SNC</td>
<td>.453</td>
<td>.694</td>
<td>.444</td>
<td>.395</td>
<td>.644</td>
<td>.634</td>
<td>.346</td>
<td>.446</td>
<td>.435</td>
</tr>
<tr>
<td>DCC</td>
<td>.611</td>
<td>.563</td>
<td>.443</td>
<td>.924</td>
<td>.704</td>
<td>.626</td>
<td>.353</td>
<td>.093</td>
<td>.386</td>
</tr>
<tr>
<td>DMC</td>
<td>.675</td>
<td>.655</td>
<td>.498</td>
<td>.684</td>
<td>.942</td>
<td>.722</td>
<td>.398</td>
<td>.396</td>
<td>.364</td>
</tr>
<tr>
<td>OPC</td>
<td>.634</td>
<td>.563</td>
<td>.532</td>
<td>.447</td>
<td>.748</td>
<td>.882</td>
<td>.396</td>
<td>.439</td>
<td>.503</td>
</tr>
<tr>
<td>OCC</td>
<td>.519</td>
<td>.320</td>
<td>.472</td>
<td>.353</td>
<td>.386</td>
<td>.346</td>
<td>.953</td>
<td>.137</td>
<td>.482</td>
</tr>
<tr>
<td>WCC</td>
<td>.226</td>
<td>.424</td>
<td>.026</td>
<td>.087</td>
<td>.375</td>
<td>.439</td>
<td>.214</td>
<td>.985</td>
<td>-.058</td>
</tr>
<tr>
<td>ADC</td>
<td>.597</td>
<td>.445</td>
<td>.579</td>
<td>.248</td>
<td>.376</td>
<td>.339</td>
<td>.482</td>
<td>.014</td>
<td>.863</td>
</tr>
<tr>
<td>LDM</td>
<td>1.000</td>
<td>.537</td>
<td>.578</td>
<td>.574</td>
<td>.729</td>
<td>.595</td>
<td>.559</td>
<td>.248</td>
<td>.615</td>
</tr>
<tr>
<td>PCM</td>
<td>.537</td>
<td>1.000</td>
<td>.409</td>
<td>.514</td>
<td>.656</td>
<td>.653</td>
<td>.397</td>
<td>.464</td>
<td>.361</td>
</tr>
<tr>
<td>SNM</td>
<td>.578</td>
<td>.409</td>
<td>1.000</td>
<td>.374</td>
<td>.517</td>
<td>.394</td>
<td>.474</td>
<td>.039</td>
<td>.571</td>
</tr>
<tr>
<td>DCM</td>
<td>.574</td>
<td>.514</td>
<td>.374</td>
<td>1.000</td>
<td>.686</td>
<td>.593</td>
<td>.318</td>
<td>.128</td>
<td>.291</td>
</tr>
<tr>
<td>DMM</td>
<td>.729</td>
<td>.656</td>
<td>.517</td>
<td>.689</td>
<td>1.000</td>
<td>.794</td>
<td>.433</td>
<td>.416</td>
<td>.415</td>
</tr>
<tr>
<td>OPM</td>
<td>.595</td>
<td>.653</td>
<td>.394</td>
<td>.595</td>
<td>.794</td>
<td>1.000</td>
<td>.406</td>
<td>.478</td>
<td>.442</td>
</tr>
<tr>
<td>OCM</td>
<td>.559</td>
<td>.397</td>
<td>.474</td>
<td>.318</td>
<td>.433</td>
<td>.406</td>
<td>1.000</td>
<td>.226</td>
<td>.489</td>
</tr>
<tr>
<td>WCM</td>
<td>.248</td>
<td>.464</td>
<td>.039</td>
<td>.128</td>
<td>.416</td>
<td>.477</td>
<td>.226</td>
<td>1.000</td>
<td>-.049</td>
</tr>
<tr>
<td>ADM</td>
<td>.615</td>
<td>.361</td>
<td>.571</td>
<td>.291</td>
<td>.415</td>
<td>.442</td>
<td>.489</td>
<td>-.049</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**Note.**
- LD = Leadership
- PC = Perception
- SN = Sensitivity
- DC = Decisiveness
- DM = Decision Making
- OC = Oral Comm.
- WC = Written Comm.
- OP = Organizing and Planning
- AD = Adaptability

C denotes clinically combined skill ratings.
M denotes mechanically combined skill ratings.
TABLE 4

Eigenvalues for
Factor Analysis of Criterion Subscales

<table>
<thead>
<tr>
<th>Factor</th>
<th>Eigenvalue</th>
<th>% of Variance</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.30961</td>
<td>71.8</td>
<td>71.8</td>
</tr>
<tr>
<td>2</td>
<td>.64226</td>
<td>10.7</td>
<td>82.5</td>
</tr>
<tr>
<td>3</td>
<td>.53658</td>
<td>8.9</td>
<td>91.5</td>
</tr>
<tr>
<td>4</td>
<td>.29794</td>
<td>5.0</td>
<td>96.4</td>
</tr>
<tr>
<td>5</td>
<td>.12850</td>
<td>2.1</td>
<td>98.6</td>
</tr>
<tr>
<td>6</td>
<td>.08510</td>
<td>1.4</td>
<td>100.0</td>
</tr>
</tbody>
</table>
TABLE 5

Varimax Rotated Factor Matrix for Clinically Combined Skills

<table>
<thead>
<tr>
<th>Skill Dimension</th>
<th>Factor 1</th>
<th>Factor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>.66180</td>
<td>.47443</td>
</tr>
<tr>
<td>Perception and Analysis</td>
<td>.62084</td>
<td>.41258</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>.18464</td>
<td>.72895</td>
</tr>
<tr>
<td>Decisiveness</td>
<td>.49482</td>
<td>.48229</td>
</tr>
<tr>
<td>Decision Making</td>
<td>.80055</td>
<td>.40179</td>
</tr>
<tr>
<td>Organizing and Planning</td>
<td>.68922</td>
<td>.39417</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>.18842</td>
<td>.58095</td>
</tr>
<tr>
<td>Written Communication</td>
<td>.56797</td>
<td>.09548</td>
</tr>
<tr>
<td>Adaptability</td>
<td>.12869</td>
<td>.76993</td>
</tr>
</tbody>
</table>
### TABLE 6

Varimax Rotated Factor Matrix for Mechanically Combined Skills

<table>
<thead>
<tr>
<th>Skill Dimension</th>
<th>Factor 1</th>
<th>Factor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>.73493</td>
<td>.44031</td>
</tr>
<tr>
<td>Perception and Analysis</td>
<td>.37054</td>
<td>.67475</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>.71491</td>
<td>.16723</td>
</tr>
<tr>
<td>Decisiveness</td>
<td>.42877</td>
<td>.50200</td>
</tr>
<tr>
<td>Decision Making</td>
<td>.51143</td>
<td>.75751</td>
</tr>
<tr>
<td>Organizing and Planning</td>
<td>.41129</td>
<td>.76360</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>.55897</td>
<td>.26671</td>
</tr>
<tr>
<td>Written Communication</td>
<td>.07486</td>
<td>.63237</td>
</tr>
<tr>
<td>Adaptability</td>
<td>.80006</td>
<td>.05346</td>
</tr>
</tbody>
</table>
TABLE 7

Similarity Coefficients for Clinical and Mechanical Factors*

<table>
<thead>
<tr>
<th>Clinical Factor</th>
<th>Mechanical Factor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>.7490</td>
<td>.9853</td>
</tr>
<tr>
<td>2</td>
<td>.9854</td>
<td>.6889</td>
</tr>
</tbody>
</table>

Note  Similarity coefficients may range from -1.0 to +1.0

* Derived through factor analysis of clinically combined skill ratings and mechanically combined skill ratings.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>R Square</th>
<th>R² Change</th>
<th>Simple R</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizing and Planning</td>
<td>0.42722</td>
<td>0.18252</td>
<td>0.18252</td>
<td>0.42722</td>
<td>18.59141</td>
</tr>
<tr>
<td>Adaptability</td>
<td>0.46033</td>
<td>0.21190</td>
<td>0.02938</td>
<td>0.03252</td>
<td>-12.74026</td>
</tr>
<tr>
<td>Perception</td>
<td>0.50317</td>
<td>0.25318</td>
<td>0.04128</td>
<td>-0.36972</td>
<td>13.90362</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>0.50901</td>
<td>0.25909</td>
<td>0.00592</td>
<td>-0.00291</td>
<td>-4.910726</td>
</tr>
<tr>
<td>Decisiveness</td>
<td>0.51351</td>
<td>0.26369</td>
<td>0.00460</td>
<td>0.27909</td>
<td>6.350871</td>
</tr>
<tr>
<td>Decision Making</td>
<td>0.51890</td>
<td>0.26925</td>
<td>0.00556</td>
<td>0.31779</td>
<td>-6.091840</td>
</tr>
<tr>
<td>Written Communication</td>
<td>0.52000</td>
<td>0.27040</td>
<td>0.00114</td>
<td>0.20629</td>
<td>-1.619214</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td></td>
<td>262.9157</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE 9

Variables Not Included in Regression Equation for Clinically Combined Skill Ratings

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta In</th>
<th>Partial R</th>
<th>Tolerance</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>-0.00957</td>
<td>-.00683</td>
<td>.37094</td>
<td>.001</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>-0.00578</td>
<td>-.00481</td>
<td>.50533</td>
<td>.001</td>
</tr>
</tbody>
</table>
### Summary Table for Multiple Regression Analysis of Mechanically Combined Skill Ratings

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>R Square</th>
<th>R² Change</th>
<th>Simple R</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizing and Planning</td>
<td>.45800</td>
<td>.20977</td>
<td>.20977</td>
<td>.45800</td>
<td>27.6768</td>
</tr>
<tr>
<td>Adaptability</td>
<td>.48246</td>
<td>.23276</td>
<td>.02300</td>
<td>.06615</td>
<td>-20.8474</td>
</tr>
<tr>
<td>Perception</td>
<td>.50511</td>
<td>.25514</td>
<td>.02237</td>
<td>.39954</td>
<td>12.3192</td>
</tr>
<tr>
<td>Written Communication</td>
<td>.51445</td>
<td>.26465</td>
<td>.00952</td>
<td>.22017</td>
<td>-6.2097</td>
</tr>
<tr>
<td>Decisiveness</td>
<td>.52533</td>
<td>.27597</td>
<td>.01131</td>
<td>.23380</td>
<td>-8.7036</td>
</tr>
<tr>
<td>Leadership</td>
<td>.54260</td>
<td>.29441</td>
<td>.01844</td>
<td>.28871</td>
<td>11.5679</td>
</tr>
<tr>
<td>Decision Making</td>
<td>.54809</td>
<td>.30040</td>
<td>.00599</td>
<td>.34238</td>
<td>-9.3123</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>.55136</td>
<td>.30400</td>
<td>.00360</td>
<td>.18908</td>
<td>4.7314</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>.55298</td>
<td>.30579</td>
<td>.00179</td>
<td>.13637</td>
<td>-2.7984</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td></td>
<td></td>
<td>291.1017</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 11

Summary Table for Multiple Regression Analysis of Mechanically and Clinically Combined Skill Ratings

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>R Square</th>
<th>R^2 Change</th>
<th>Simple R</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Org. and Planning-M</td>
<td>.45800</td>
<td>.20977</td>
<td>.20977</td>
<td>.45800</td>
<td>32.2964</td>
</tr>
<tr>
<td>Oral Comm.-C</td>
<td>.48917</td>
<td>.23929</td>
<td>.02952</td>
<td>-.00291</td>
<td>-86.6418</td>
</tr>
<tr>
<td>Oral Comm.-M</td>
<td>.59526</td>
<td>.35433</td>
<td>.11504</td>
<td>.13637</td>
<td>79.8012</td>
</tr>
<tr>
<td>Decisiveness-C</td>
<td>.61104</td>
<td>.37337</td>
<td>.01904</td>
<td>.27909</td>
<td>21.7954</td>
</tr>
<tr>
<td>Adaptability-M</td>
<td>.62057</td>
<td>.38511</td>
<td>.01174</td>
<td>.06615</td>
<td>-35.3386</td>
</tr>
<tr>
<td>Decisiveness-M</td>
<td>.63003</td>
<td>.39693</td>
<td>.01182</td>
<td>.23380</td>
<td>-14.3032</td>
</tr>
<tr>
<td>Sensitivity-M</td>
<td>.63719</td>
<td>.40601</td>
<td>.00908</td>
<td>.18908</td>
<td>17.8209</td>
</tr>
<tr>
<td>Decision Making-M</td>
<td>.64456</td>
<td>.41546</td>
<td>.00945</td>
<td>.34238</td>
<td>-13.9587</td>
</tr>
<tr>
<td>Leadership-M</td>
<td>.65186</td>
<td>.42492</td>
<td>.00946</td>
<td>.28871</td>
<td>20.8762</td>
</tr>
<tr>
<td>Leadership-C</td>
<td>.67010</td>
<td>.44903</td>
<td>.02410</td>
<td>.23716</td>
<td>-16.5185</td>
</tr>
<tr>
<td>Perception-C</td>
<td>.68023</td>
<td>.46271</td>
<td>.01369</td>
<td>.36972</td>
<td>16.5149</td>
</tr>
<tr>
<td>Written Comm.-M</td>
<td>.68463</td>
<td>.46872</td>
<td>.00601</td>
<td>.22017</td>
<td>-5.0831</td>
</tr>
<tr>
<td>Adaptability-C</td>
<td>.68670</td>
<td>.47156</td>
<td>.00284</td>
<td>.03252</td>
<td>16.4909</td>
</tr>
<tr>
<td>Org. and Planning-C</td>
<td>.68935</td>
<td>.47521</td>
<td>.00365</td>
<td>.42722</td>
<td>-10.4200</td>
</tr>
<tr>
<td>Sensitivity-C</td>
<td>.69222</td>
<td>.47917</td>
<td>.00397</td>
<td>.15510</td>
<td>-12.5520</td>
</tr>
<tr>
<td>Perception-M</td>
<td>.69572</td>
<td>.48402</td>
<td>.00485</td>
<td>.39954</td>
<td>-9.7786</td>
</tr>
<tr>
<td>Decision Making-C</td>
<td>.69644</td>
<td>.48502</td>
<td>.00100</td>
<td>.31779</td>
<td>5.1992</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>286.7544</td>
</tr>
</tbody>
</table>

Note C = Clinical, M = Mechanical
TABLE 12

Variables Not Included in Regression Equation for Mechanically and Clinically Combined Skill Ratings

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta In</th>
<th>Partial R</th>
<th>Tolerance</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Comm.-C</td>
<td>.08169</td>
<td>.01660</td>
<td>.02126</td>
<td>.006</td>
</tr>
</tbody>
</table>

*Note. C = Clinical*
REFERENCES


Sackett, P.R., & Hakel, M.D. Temporal stability and individual differences in using assessment information to form overall ratings. *Organizational Behavior and Human Performance*, 1979, 23, 120-137.


Shirkey, E. Personal communication, June 17, 1982.


