A CANONICAL CORRELATIONAL ANALYSIS OF THE RELATIONSHIP BETWEEN ETC(1)
A CANONICAL CORRELATIONAL ANALYSIS
OF THE RELATIONSHIP BETWEEN OBSERVED
LEADER BEHAVIORS AND ORGANIZATIONAL REWARDS

Thomas W. Kess
Creighton University

Fred Luthans
University of Nebraska-Lincoln

Harry W. Hennessey
University of Nebraska-Lincoln

Send correspondence to:

Fred Luthans
Department of Management
University of Nebraska-Lincoln
Lincoln, NE 68588-0400
Phone: 402-472-2324/3915
**A Canonical Correlational Analysis of the Relationship Between Observed Leader Behavior and Organizational Rewards**

**Authors:**
Thomas W. Kess, Fred Luthans, Harry W. Hennessey

**Performing Organization:**
Department of Management, University of Nebraska, Lincoln, NE 68588-0400

**Controlling Office:**
Organizational Effectiveness Research Group, Office of Naval Research (Code 442), Arlington, VA 22217

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A canonical correlation analysis was conducted to examine the relationship between 3 organizational reward criterion variables and 12 leadership behavior categories using the newly developing Leadership Observation System of measurement. Managers (N=49) from a large financial institution served as subjects in the study. One canonical root was extracted for interpretation which inversely related the behaviors of exchanging routine information & socializing/politicking with salary & promotion rewards. Implications of results for the study of leadership are discussed.
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Leadership has been the subject of considerable research activity and scholarly debate for over three decades. Traditionally, these efforts have sought to discover the impact that leader behavior has on subordinate performance and satisfaction (Bass, 1981; Fleishman, 1973; Yukl, 1981). However, in the past several years, the traditional approaches have been subjected to increased scrutiny and criticism (e.g., see: Hunt & Larson, 1979; Hunt, Sekaran, & Schriesheim, 1982). New directions for theory and research have been suggested as previous approaches have been found lacking or empirically unsupported.

A good example of the changes that are occurring in the field of leadership is in the methodologies that are used. The dominant approach employing questionnaire measures is being increasingly criticized. The use of alternative observational measures has been specifically proposed (Luthans, 1979; Luthans & Davis, in press) and is currently undergoing development by Luthans and his colleagues (Luthans & Lockwood, 1982; Luthans, Lockwood & Conti, 1981) and a few others (e.g., see: Bussem, Larson & Vicars, 1982). The singular theoretical perspective of viewing leadership as a causal determinant of subordinate performance and satisfaction has also been supplemented with efforts to determine the impact of subordinate behaviors on the behavior of the leader (Greene, 1974; Davis & Luthans, 1979). Contingency approaches which explore leadership in situational contexts have been developed (Bass and Valenzi, 1974; Fiedler, 1967) and more recently leadership research and theory has explored information-processing and cognitive style (Wynne and Husaker, 1975); behavioral decision making (Jago and Vroom, 1975); vertical dyad linkages and roles (Graen and Cashman, 1975); and social learning (Davis & Luthans, 1979; Luthans, 1979; Davis & Luthans, 1980; Luthans, 1981).
The social learning approach views the leader, the environment, and the leader's behavior as *interacting* variables rather than the traditional view that leadership somehow stands alone or makes a unilateral input into subordinates' performance. In addition to the interactive notion, the social learning approach also emphasizes the importance that reinforcing contingencies have on leader and subordinate behavior. In particular, a social learning perspective would say that organizational rewards such as salary and promotion would have an important impact on leader behavior (and vice versa, i.e., leader behavior would have an important impact on organizational rewards). This interactive relationship between leader behavior and organizational rewards has been largely ignored in the study of leadership. Although the impact that organizational rewards has on employee performance and satisfaction has received considerable attention over the years and the role of leaders in administering rewards has recently been emphasized (in path goal theories such as House, 1971) the interactive relationship between leader behavior and organizational rewards has not.

The present study was designed to analyze this relationship. Specifically, this study attempts to determine whether organizational rewards such as salary progression and promotion are related to particular leadership behaviors. Do organizations reward particular kinds of leader behaviors, and if so, which behaviors are being rewarded? If such a relationship between leader behaviors and rewards exists, our understanding of leadership may be enhanced. For example, identifying which leadership behaviors seem to be rewarded may improve our ability to induce changes in leader behavior and/or eventually organizational outcomes. Further, it may be the case that organizational reward systems influence the nature of leaders themselves and other environmental contingencies. Organizational reward systems may, for example, affect a leader's confidence and the perceived legitimacy as well as other subordinate perceptions and expectations. In other words, from a
social learning perspective, organizational rewards which are manipulable can affect leaders (e.g., their confidence in themselves), subordinates (e.g., their expectations and reactions to the leader), and the leader's behavior (e.g., accelerate or decelerate certain leader behaviors that are linked to effective performance outcomes). This study represents a first step in understanding these questions by simply examining if there is a relationship between organizational rewards and certain leader behaviors in one organizational setting.

Method

Subjects

One of the organizations used in an ongoing larger study provided subjects for the present investigation. Managers from the president down to first-line supervisors from a fairly large financial institution served as target leaders \( N = 52 \). In other words, managers who had subordinates directly reporting to them were arbitrarily defined as leaders in this study. Usable data were generated for 49 of these leaders with attrition due to missing values for the three others. The target leaders used as subjects typically had been with this financial organization 6-10 years and in the present positions 1-5 years. Almost all of them fell in the 26-55 age range and a great majority had a college education.

The Observational Measurement Instrument and Procedure

The developing Leadership Observation System or simply LOS instrument used in this study is described in detail elsewhere (Luthans & Lockwood, 1982). The LOS contains 12 leader behavior categories as follows: (1) planning/coordinating, (2) staffing, (3) training/developing, (4) decision-making/problem solving, (5) processing paperwork, (6) exchanging routine information, (7) monitoring/controlling performance, (8) motivating/reinforcing, (9) disciplining/punishing, (10) interac-
ting with outsiders, (11) managing conflict, and (12) socializing/politicking. Each of these categories is defined in terms of observable behaviors. For example, monitoring/controlling performance is described behaviorally for the observer as: (a) inspecting work, (b) walking around and checking things out, touring, (c) monitoring performance data (e.g., looking over computer printouts, production or financial reports) and (d) doing preventative maintenance. The format of the LOS is that the behavioral categories are along the left hand side and eight random times along the top. A comprehensive reliability assessment of the LOS indicated quite high interrater agreement (93.5%) using this instrument (Luthans, Lockwood & Conti, 1981) and preliminary analysis of its construct validity is also quite promising (Luthans & Lockwood, 1982).

The procedure was to first give an extensive training workshop to selected participant observers (mostly secretaries and key subordinates of the target leaders in the study). This training stressed potential observational errors (following Thornton & Zorich, 1980) and how to overcome them and going over in detail the LOS instrument giving attention and analysis to the 12 behavioral categories. Role playing skits were used in this training to demonstrate and critique.

These trained participant observers then filled out the LOS instrument 80 times on each target leader over a two-week period of time (a random 10-minute period of each working hour over two weeks). This represents a total of almost 4000 possible observation periods (80 observations X 49 target leaders). The actual number was slightly less because the target manager was not always available to be observed.

Measures of Organizational Rewards

Three measures of organizational rewards were used in the study: (1) a salary progression index (SPI); (2) a measure of whether a manager's salary was in the top, middle or lowest one-third of the pay scale at his/her level in the organization
(PAY3RD); (3) and a promotion index (PI). The salary progression index was computed by dividing PAY3RD by the number of years the manager had held his/her current position. As such, this measure was used to represent the rapidity of salary progression. The larger the SPI score, the faster the salary advancement. The PAY3RD variable was scored with 3 equal to the top one-third of the pay scale, a 2 for the middle third, and a 1 equal to the bottom one-third. The promotion index was designed so that higher scores indicate more recent promotion to a higher level within the organization. Specifically, the performance index was calculated as follows:

\[
\text{PI} = 5 - ((\text{Position Tenure}/\text{Organization Tenure}) \times \text{Level})
\]

Level 1 representing the highest level and level 5 the lowest level; organization and position tenure each was coded with 1 indicating the shortest tenure and 5 the longest tenure.

Statistical Method of Analysis Used

Since both the measures of organizational rewards and leadership behavior are multivariate, a canonical correlation was deemed to be the most appropriate way to analyze the data. Canonical correlation analysis is a method which enables one to examine relationships between sets of multiple criterion and multiple predictor variables (Hair, Anderson, Tatham and Grabowski, 1979). This method develops independent canonical functions that maximize the correlation between linear composites of sets of criterion and predictor variables. In the present study the three measures of organizational rewards were considered the criterion variables and the twelve leadership behavior categories were used as predictor variables. This designation reflects the research question of whether organizational rewards received by managers can be predicted by leader behaviors. However, it must be remembered that as in any correlational study, causal relationships are not directly
revealed by this statistical analysis.

Results

The results of the canonical correlational analysis are shown in Table 1. As shown, there is one moderately significant ($p < .07$) canonical root that was extracted with a canonical correlation ($R$) = .70. The other two roots do not approach significance and are therefore not interpreted. The canonical loadings are analogous to factor loadings in factor analysis and can be used to assess the relative contribution of each variable to the extracted canonical function. All three criterion variables have high negative loadings (-.63 for PAY3RD -.88 for SPI, and -.78 for PI.) At the same time, the leader behavior predictor variables of "Exchanging Routine Information" and "Socializing/Politicking" have high positive loadings (.55 and .66 respectively). Thus, these findings show an inverse relationship between the two leader behavior predictor variables and the three measures of organizational rewards. In other words, high frequencies of the leader behaviors of "Exchanging Routine Information" and "Socializing/Politicking" are associated with low degrees of organizational rewards related to salary and promotion.

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Insert Table 1 About Here
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Further Analysis of the Relationship Found

Since the significance test of the canonical correlation ($R = .70$) indicates only a moderately significant relationship between the two sets of variables ($p < .07$), the magnitude of the relationship warrants further examination. A redundancy index has been proposed as a measure of the strength of this relationship (Alpert and Peterson, 1972; Stewart and Love, 1968). Whereas the squared canonical correlations provide an estimate of the shared variance between the canonical variates, the redundancy index represents the average squared correlation coefficients between the
total predictor set and each variable in the criterion set. Therefore, the redundancy index provides a summary measure of the ability of the predictor variable set to explain variation in the criterion variables taken one at a time. The results of the redundancy analysis are presented in Table 2.

As the table indicates, 49% of the variance between the two sets of variables is shared variance. Using the redundancy index as a measure of the magnitude of the relationship, it is found that 29% of the variance in the dependent variables has been explained by the canonical variate for the predictor set. By the same token, 6% of the variance in the independent variables has been explained by the canonical variate for the criterion set.

Discussion

The results of this study indicate that a relationship between particular leader behaviors and organizational rewards appears to exist. Specifically, the observed behaviors of exchanging routine information and socializing/politicking are inversely related to salary level, a salary progression index, and a promotion index. Although this relationship yields only a moderately significant result (\(p < .07\)), the amount of variance in the criterion variables explained by the predictor set of leadership behaviors provides additional evidence of the meaningfulness of the results obtained. While the measure of the proportion explained between the two sets of variables is relatively high (\(R^2 = .49\)), even the more conservative redundancy measure indicates a level of explained variance which is commonly reported in behavioral science literature (redundancy index = .29). At least as a first step, this study suggests that further investigation of the relationship between leader behaviors and organizational rewards is clearly warranted. Also, the lower redund-
dancy index measure for the predictor set (.06) confirms the appropriateness of the approach taken here, namely that leadership behaviors can more effectively predict various degrees of salary and promotion attainment than can salary and promotion attainment predict leadership behaviors.

Although a meaningful relationship appears to exist between leadership behaviors and organizational rewards, the precise interpretation of the nature of this relationship is more difficult. It comes as no surprise to discover that exchanging routine information and socializing/politicking are important variables in the present study. For example, Bass and Valenzi (1974) have previously identified informational access and power distribution as important determinants of leadership style. What is unexpected is the direction of that relationship. The present findings suggest that what trained participant observers measured as highly frequent leader behaviors of exchanging routine information and socializing/politicking are associated with lower degrees of salary and promotion attainment. This finding is surprising given the normative importance attributed to information generation and processing in the literature (e.g., see: Shapira and Dunbar, 1980), and the current emphasis given to the importance of organizational politics (e.g., see: Perrow, 1970; Pfeffer, 1977).

Although the direction of the relationship is not readily understood in the light of current literature on leadership, one can speculate about possible explanations. It is possible, of course, that the results reflect the uniqueness of the organization from which the data was collected. For example, those who make personnel decisions on promotion and salary in this organization may hold a negative view toward these two types of behaviors. Another possibility is that these behaviors may be deemed to be important, but those who exhibit them are simply not being rewarded. To investigate these possibilities, further studies should include leaders in a variety of organizational settings.
Another possible explanation of why the results differ from what the literature would dictate may be a function of the measures used to obtain the behavioral data. As the introductory comments indicated, questionnaire measures have almost been exclusively used in researching organizational behavior. There is some evidence that indicates how subordinates describe leaders' behaviors on questionnaires may be quite different from how leaders are observed to behave in their natural setting (Luthans & Lockwood, 1982). Even in this study an attempt was made to analyze the relationship between leader behaviors as measured by the LBDQ-XII (Stogdill, 1963) and the three criterion variables (organizational rewards). The results indicated one moderately significant ($p < .02$) canonical variate, but the redundancy analysis indicated that only 4% of the variation in the criterion variables was explained by the canonical variate for the predictor set. The same is true of the research which indicates the importance of information processing and organizational politics—questionnaires, not direct observations in situ, are used to gather the data (e.g., see: Patchen, 1974). In other words, data gathered by questionnaires may lead to different conclusions than data gathered by direct observations in situ. This, of course, does not say that questionnaire gathered data are wrong and data gathered by observations are right. Obviously, a case could be made for the limitations of the observational measures used in this study. By measuring only the frequency of behaviors and not necessarily the significance of the behaviors for the organization or the qualitative nature of the behaviors, important dimensions of leader behavior may be ignored. It is possible, for example, that instead of reflecting the importance of exchanging routine information in an information processing sense or socializing/politicking, in a pragmatic power sense, the frequency count of these behaviors may instead reflect lesser control of the leader's time or shorter work cycles. Less effective time management or shorter work cycles may help explain the fact that these leaders did not fare as well with
the organizational rewards as their counterparts who did not exhibit these behaviors as often. This line of discussion is, of course, merely speculative and further research would be needed to clarify the exact nature of the relationship discovered.

The important contribution of this study is not the particular relationship discovered, but rather the demonstration that a relationship between leader behaviors and organizational rewards does indeed exist. Further research is needed to more clearly identify which leadership behaviors are rewarded and whether different behaviors are rewarded at different levels, in different functional areas, or in different types of organizations. The traditional approaches which attempt to explain leader behavior through emergent processes can thus be expanded to include the impact of organizational reward systems on leader's behaviors. From a social learning perspective in general and a reinforcement perspective in particular, the relationship may help explain why leaders choose the behaviors they exhibit. In addition, the relationship may help further our understanding of the selection process and enable leadership development programs to more effectively introduce change in the behaviors of leaders.

The use of canonical correlation analysis would appear to be a useful statistical/analytical tool for further investigating the relationship between leader behaviors and organizational rewards. As demonstrated in the present study, this tool enables an analysis to be made of the shared variance of two sets of variables. Especially from a social learning perspective, leadership is treated as multidimensional. Unless a single effective measure of organizational rewards is constructed, the multivariate approach used in the present study appears appropriate, although a variety of other measures reflecting organizational rewards needs to also be developed.
References


Stogdill, R.M. Manual for the leader behavior description questionnaire - Form XII, Columbus, Ohio: Bureau of Business Research, Ohio State University, 1963.


Table 1

Canonical Analysis Results

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<tr>
<th>Variables</th>
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<td>Promotion Index (PI)</td>
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|                      |     |     |    |     |     |     |    |     |     |     |    |     |     |
|                      | 1.78|     |     |     | .96 |     |     |     |     |     |     |     |     |
| Independent Set       |     |     |    |     |     |     |    |     |     |     |    |     |     |
| Decision-Making/Problem Solving| .02 | .36 | .13 | .09 | .09 | .42 | .18 | .12 | -.59 | -.50 | .25 | .20 |
| Disciplining/Punishing | -.23 | .15 | .02 | .01 | -.31 | .03 | .00 | .00 | -.46 | -.06 | .00 | .00 |
| Exchanging Routine Information | .39 | .55 | .30 | .21 | -.07 | .21 | .04 | .03 | -.10 | -.53 | .28 | .22 |
| Interacting With Outsiders | -.38 | .09 | .01 | .01 | -.28 | -.02 | .00 | .00 | -.68 | -.66 | .44 | .35 |
| Managing Conflict      | .11 | .11 | .01 | .01 | .07 | .24 | .06 | .04 | .08 | -.16 | .03 | .02 |
| Monitoring/Controlling Performance | -.54 | -.19 | .04 | .03 | .70 | .67 | .45 | .31 | .00 | -.22 | .05 | .04 |
| Motivating/Reinforcing  | .04 | .11 | .01 | .01 | -.34 | .32 | .10 | .07 | .34 | -.12 | .01 | .01 |
| Planning/Coordinating   | .40 | .41 | .17 | .12 | .71 | .65 | .42 | .29 | .04 | -.05 | .00 | .00 |
| Processing Paperwork    | .31 | .43 | .18 | .12 | .40 | .22 | .05 | .03 | -.16 | -.35 | .12 | .09 |
| Socializing/Politicking | .41 | .66 | .44 | .30 | -.40 | -.11 | .01 | .01 | .26 | -.15 | .02 | .02 |
| Staffing               | .41 | .37 | .41 | .10 | .14 | .01 | .00 | .00 | .65 | .19 | .03 | .02 |
| Training/Developing     | -.16 | -.04 | .00 | .00 | .04 | .39 | .15 | .10 | .45 | .20 | .04 | .03 |

|                      |     |     |    |     |     |     |    |     |     |     |    |     |     |
|                      | 1.45|     |     |     | 1.46|     |     |     |     |     |     |     |     |
| Canonical R          | .70 |     |     |     | .57 |     |     |     |     |     |     |     |     |
| Canonical Root (R²)  | .49 |     |     |     | .49 |     |     |     |     |     |     |     |     |
| F Statistic          | 1.4612|     |     |     | 1.0506|     |     |     |     |     |     |     |     |
| Degrees Freedom (num/denom) | 36/101.18 |     |     |     | 22/70 |     |     |     |     |     |     |     |     |
| Level of Significance| .07 |     |     |     | .42 |     |     |     |     |     |     |     |     |

Note: The numbers in the W column are canonical weights; the numbers in the L column are the canonical loadings; the loadings are squared and reported in the L² column; and the percentage sums of loadings are shown in the Χ² L² column.
Table 2

Redundancy Analysis Results

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LIST 1
MANDATORY

Defense Technical Information Center
ATTN: DTIC DDA-2
Selection and Preliminary Cataloging Section
Cameron Station
Alexandria, VA 22314

Library of Congress
Science and Technology Division
Washington, DC 20540

Office of Naval Research
Code 452
800 N. Quincy Street
Arlington, VA 22217

Naval Research Laboratory
Code 2627
Washington, DC 20375

Office of Naval Research
Director, Technology Programs
Code 200
800 N. Quincy Street
Arlington, VA 22217

Office of Naval Research
Code 450
800 N. Quincy Street
Arlington, VA 22217

Office of Naval Research
Code 458
800 N. Quincy Street
Arlington, VA 22217

Office of Naval Research
Code 455
800 N. Quincy Street
Arlington, VA 22217

LIST 2
ONR FIELD

ONR Western Regional Office
1030 E. Green Street
Pasadena, CA 91106

Psychologist
ONR Western Regional Office
1030 E. Green Street
Pasadena, CA 91106

ONR Regional Office
536 S. Clark Street
Chicago, IL 60603

Psychologist
ONR Regional Office
536 S. Clark Street
Chicago, IL 60603

ONR Eastern/Central Regional Office
Bldg. 114, Section D
666 Summer Street
Boston, MA 02210

ONR Eastern/Central Regional Office
Bldg. 114, Section D
666 Summer Street
Boston, MA 02210
Deputy Chief of Naval Operations (Manpower, Personnel, and Training)
Head, Research, Development, and Studies Branch (Op-115)
1812 Arlington Annex
Washington, DC 20350

Director
Civilian Personnel Division (OP-14)
Department of the Navy
1803 Arlington Annex
Washington, DC 20350

Deputy Chief of Naval Operations (Manpower, Personnel, and Training)
Director, Human Resource Management Plans and Policy Branch (Op-150)
Department of the Navy
Washington, DC 20350

Deputy Chief of Naval Operations (Manpower, Personnel, and Training)
Director, Human Resource Management Plans and Policy Branch (Op-150)
Department of the Navy
Washington, DC 20350

Chief of Naval Operations
Head, Manpower, Personnel, Training and Reserves Team (Op-964D)
The Pentagon, 4A478
Washington, DC 20350

Chief of Naval Operations
Assistant, Personnel Logistics Planning (Op-987H)
The Pentagon, 5D772
Washington, DC 20350

NPRDC

Commanding Officer
Naval Personnel R&D Center
San Diego, CA 92152

Naval Personnel R&D Center
Washington Liaison Office
Building 200, 2N
Washington Navy Yard
Washington, DC 20374

Naval Material Command
Management Training Center
NAVMAT 09M32
Jefferson Plaza, Bldg #2, Rm 150
1421 Jefferson Davis Highway
Arlington, VA 20360

Naval Material Command
NAVMAT-00K
J.W. Tweeddale
Washington, DC 20360

Naval Material Command
NAVMAT-00K3
Washington, DC 20360

Naval Material Command
(MAT-03)
Crystal Plaza #5
J.E. Colvard
Room 236
2211 Jefferson Davis Highway
Arlington, VA 20360

Chief of Naval Operations
Assistant, Personnel Logistics
Planning (Op-987H)
The Pentagon, 5D772
Washington, DC 20350

Naval Personnel R&D Center
San Diego, CA 92152
Dr. Robert Penn (1 copy)
Ed Aiken (1 copy)
Sequential by State/City

LIST 5
BUMED

NAVAL ACADEMY AND NAVAL POSTGRADUATE SCHOOL

Commanding Officer
Naval Health Research Center
San Diego, CA 92152

CDR William S. Maynard
Psychology Department
Naval Regional Medical Center
San Diego, CA 92134

Naval Submarine Medical Research Laboratory
Naval Submarine Base
New London, Box 900
Groton, CT 06349

Director, Medical Service Corps
Bureau of Medicine and Surgery
Code 23
Department of the Navy
Washington, DC 20372

Naval Aerospace Medical Research Lab
Naval Air Station
Pensacola, FL 32508

Program Manager for Human Performance (code 44)
Naval Medical R&D Command
National Naval Medical Center
Bethesda, MD 20014

Naval Postgraduate School
ATTN: Dr. Richard S. Elster (code 012)
Department of Administrative Sciences
Monterey, CA 93940

Naval Postgraduate School
ATTN: Professor John Senger
Operations Research and Administrative Science
Monterey, CA 93940

Superintendent
Naval Postgraduate School
Code 1424
Monterey, CA 93940

Naval Postgraduate School
ATTN: Dr. Richard A. McGonigal
Code 54-Aa
Monterey, CA 93940

U.S. Naval Academy
ATTN: CDR J. H. McGrath
Department of Leadership and Law
Annapolis, MD 21402

Professor Carson K. Eoyang
Naval Postgraduate School, Code 54EG
Department of Administration Sciences
Monterey, CA 93940

Superintendent
ATTN: Director of Research
Naval Academy, U.S.
Annapolis, MD 21402
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LIST 8
NAVE MISCELLANEOUS

Naval Military Personnel Command
HRM Department (NMPC-6)
Washington, DC 20350

Naval Training Analysis
and Evaluation Group
Orlando, FL 32813

Commanding Officer
ATTN: TIC, Bldg. 2068
Naval Training Equipment Center
Orlando, FL 32813

Chief of Naval Education
and Training (N-5)
Director, Research Development,
Test and Evaluation
Naval Air Station
Pensacola, FL 32508

Chief of Naval Technical Training
ATTN: Dr. Norman Kerr, Code 017
Naval Air Station
Memphis (75)
Millington, TN 38054

Naval Recruiting Command
Head, Research and Analysis Branch
Code 434, Room 8001
801 North Randolph Street
Arlington, VA 22203

Commanding Officer
USS Carl Vinson (CVN-70)
Newport News Shipbuilding &
Drydock Company
Newport News, VA 23607

List 9
USMC

Headquarters, U.S. Marine Corps
Code MPL-20
Washington, DC 20380

Headquarters, U.S. Marine Corps
ATTN: Dr. A. L. Slafkosky,
Code RD-1
Washington, DC 20380

Education Advisor
Education Center (E031)
MCDEC
Quantico, VA 22134

Commanding Officer
Education Center (E031)
MCDEC
Quantico, VA 22134

Commanding Officer
U.S. Marine Corps
Command and Staff College
Quantico, VA 22134
LIST 13
AIR FORCE

Air University Library/LSE 76-443
Maxwell AFB, AL 36112

COL John W. Williams, Jr.
Head, Department of Behavioral Science and Leadership
U.S. Air Force Academy, CO 80840

MAJ Robert Gregory
USAFA/DFBL
U.S. Air Force Academy, CO 80840

AFOSR/NL (Dr. Fregly)
Building 410
Bolling AFB
Washington, DC 20332

LTCOL Don L. Presar
Department of the Air Force
AF/MFXHM
Pentagon
Washington, DC 20330

Technical Director
AFHRL/MO(T)
Brooks AFB
San Antonio, TX 78235

AFMPC/MPCYPR
Randolph AFB, TX 78150

LIST 12
ARMY

Headquarters, FORSCOM
ATTN: AFPR-HR
Ft. McPherson, GA 30330

Army Research Institute
Field Unit - Leavenworth
P.O. Box 3122
Fort Leavenworth, KS 66027

Technical Director
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

Director
Systems Research Laboratory
5001 Eisenhower Avenue
Alexandria, VA 22333

Director
Army Research Institute
Training Research Laboratory
5001 Eisenhower Avenue
Alexandria, VA 22333

Dr. T. O. Jacobs
Code PERI-TH
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

COL Howard Prince
Head, Department of Behavioral Science and Leadership
U.S. Military Academy, New York 10996