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# ALS AND VDL APPROACHES TO LEADERSHIP RESEARCH: AN EMPIRICAL COMPARISON


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

This study compares the average leadership style (ALS) with the vertical dyad linkage (VDL) model by partitioning subordinate perceptions of leadership style into between groups and within-group sources of variance. The results indicate that ALS and VDL models account for similar proportions of variance in subordinate role perceptions, satisfaction, and organizational commitment.

Traditionally, leadership theories have made one of two assumptions about how leaders interact with their subordinates. One commonly held assumption is that leaders employ a relatively fixed repertoire of behaviors both across situations and subordinates (e.g. Fiedler, 1971; Flieshman, 1973; Stodgill, 1974). Some theorists, such as Fiedler, Chemers, and Mahar (1976), have gone so far as to suggest that leaders be selected for jobs based on the match between situational favorability and the leader's inherent and enduring leadership style. This view might be termed the average leadership style (ALS) approach.

The other major assumption is that leaders interact with subordinates on an individual basis. The model most exemplary of this notion is the vertical dyad linkage (VDL) model (Cashman, Dansereau, Graen, & Haga, 1976; Dansereau, Cashman & Graen, 1973; Dansereau, Graen & Haga, 1975; Graen & Cashman, 1975). In the VDL model it is assumed that leaders portray differential behaviors to their subordinates on the basis of: "(a) competence and skill, (b) extent to which they can be trusted, and (c) motivation to assume greater responsibility within the unit." (Liden & Graen, 1980, pp. 451-452). Those individuals whom a leader rates highly on these dimensions are given preferential treatment and are termed the "in-group." Those members judged to be low on these dimensions are said to constitute an "out-group." VDL postulates that in-group members receive greater attention and support from the leader while the out-group members experience a more formal exchange with the leader. For this reason the dyadic superior-subordinate relationship is thought to be the appropriate unit of analysis in leadership research.

Which of these two models (ALS or VDL) an investigator chooses has implications for how leadership measures, such as the LBDQ, are treated. A scale assessing a subordinate's perception of a leader can be thought of as being composed of several sources of variance: a) the characteristic or average, leadership style of the leader being rated, b) the style which that leader displays to that subordinate in particular, and c) error. The error component includes the influence of characteristics of the subordinate doing the rating such as leniency, halo, and so forth. In the ALS model the individual component (b) is thought to be zero, thus any variance in subordinate ratings of the same leader is thought to reflect only error. Dansereau and Dumas (1977) note that once this homogeneity of leader behavior assumption is made a concommitant set of measurement and empirical procedures logically follow. For instance, to obtain a reliable measure of a leader's initiating structure behavior one should randomly sample members of the work group and average their perceptions. In other words, the ALS model dictates a group level of analysis where scores are aggregated at the level of the leader before they are related to any criteria. The VDL model dictates that individual raw scores be the ones that are related to criteria. The ALS and VDL models, then, are opposing theoretical formulations which make different predictions about the effects of leader behavior. Fortunately, these opposing models can be tested empirically and the purpose of this paper is to provide such a test.

## Previous Research

While many studies have examined correlations among leadership variables and outcome variables at the dyadic level of analysis, such correlations, when significant, cannot be interpreted as evidence favoring the VDL model over the

ALS model. Such correlations reflect the combined effects of between-leader (ALS) effects and within-leader (VDL) effects. To date, three studies have attempted to compare VDL and ALS models.

A study by Dansereau, Cashman, and Graen (1973) examined correlations between LBDQ scores and turnover rate. To estimate ALS effects they averaged the subordinate-supplied LBDQ scores for each leader, while the raw LBDQ scores were used to represent the VDL model. They found that only the raw (individual) scores were significantly related to turnover. Similarly, Dansereau, Graen, and Haga (1975) found that individual negotiating latitude scores (used to assess the quality of the leader-member exchange) were more highly correlated with employee outcome variables than were averaged negotiating latitude scores. Neither of these studies, however, provides a fair comparison of VDL and ALS models because individual scores include both ALS and VDL variance and not VDL variance above.

A recent study by Katerberg and Hom (1981), however, addressed this methodological issue by partialling average leadership scores from individual scores. With data from 672 members of the Army National Guard, they averaged LBDQ scores (consideration and initiating structure) across subordinates for each leader unit and assigned these average scores to each subordinate in the unit. Using hierarchical multiple regression analyses (described below), they found significant ALS and VDL effects in predicting all criteria (satisfaction with leaders, guard unit, and coworkers, and perceptions of role clarity and conflict). Generally, VDL effects tended to be larger than ALS effects, although the former are probably more inflated by common methods variance than the latter.

The present study represents a replication and extension of the Katerberg and Hom (1981) investigation. The extension is operationalized on several dimensions. First, the present study employs a sample of mostly full-time civilian personnel from three different organizations. This sample is considerably more heterogeneous than Katerberg and Hom's which was 96% male, military, and (presumably) part-time. Secondly, the present study uses two different measures of leader behavior (the LBDQ and the MBS), and examines organizational commitment as an additional employee outcome variable. The commitment variable is a potentially useful extension because it, unlike the role perception and satisfaction variables, contains behavioral intentions of the respondent (i.e. intentions to turnover/remain with the organization). Measures of intention to turnover have been the best single predictors of actual turnover behavior (Mobley et al., 1979). Finally, the present investigation compares two statistical analyses to test the relative effects of the ALS and VDL models. The regression analyses employed by Katerberg and Hom are compared with the within and between analysis (WABA) method recently advocated by Dansereau and his associates (Dansereau & Dumas, 1977; Yammerino, Dansereau, Markham, & Alutto, 1980).

## Method

The sample consisted of managerial and non-managerial members of three organizations. From a relatively large financial institution 257 employees were sampled representing all organizational functions and levels. The median age was 36 years, 106 had completed college, and 16 held graduate degrees. Eighty members came from a state agency. Their median age was 35 years, 25 had completed college, and 3 held graduate degrees. Finally, 80 employees were sampled from a manufacturing plant. Their median age was 36, 19 had completed college, and 3 had not completed high school. In all, 424 employees were sampled. Of these, complete data sets were compiled for 339. About half of the sample were female.

The subordinates in the sample were members of groups ranging in size from 2 to 6. There were 88 such groups (average size was 3.85), each of which reported to a different leader.

Measures

A questionnaire packet containing all the measures was completed by respondents at the workforce. In addition to demographic items, the packet was composed of the following scales.

Leader descriptions. The Consideration and Initiating Structure scales were used from the Leader Behavior Description Questionnaire (LBDQ-Form XII). In addition, 4 scales from the Managerial Behavior Survey (MBS) (Yukl & Nemeroff, 1979) were employed: 1) consideration, 2) decision participation, 3) goal-setting, and 4) role clarification. These four scales were chosen from among the 19 MBS scales because they most closely parallel the constructs measured with the LBDQ (Yukl, 1981). The inclusion of the MBS scales allows one to address the issue of whether findings from the study might be due to the specific properties of the LBDQ.

Subordinate outcomes. Satisfaction with supervision and satisfaction with coworkers were measured with scales from the Job Descriptive Index (JDI) (Smith, Kendall, & Hulin, 1969). Employee perceptions of role conflict and ambiguity were assessed with the scales developed by Rizzo, House, and Lirtzman (1970). Organizational commitment was measured with the scale by Mowday, Steers, and Porter (1979).

These outcome measures (particularly the satisfaction and role perception scales) were used in order to replicate the findings of Katerberg and Hom (1981), and because they are commonly measured reactions to leadership.

Analytic Methods. Dansereau and Dumas (1977) and Yammerino et al. (1980) have proposed a methodology for assessing whether data fit a VDL or ALS model. In this within and between analysis (WABA), correlations between predictors and criteria are computed on both a within-cell and a between-cell basis. For the within-cell correlations, deviation scores are computed for each variable, based on a subordinate's deviation from the variable mean for his or her work group. If the VDL model is the correct one then the correlations between these deviation scores (within-cell correlations) should be significant, while the between-cell correlations are zero. The appropriate degrees of freedom for each of these correlations are N-g-1, where N is the total sample size and g is the number of work groups (supervisors).

The between-cell correlations are also based on deviation scores. In this case, each subject is given the mean variable score for his or her work group. Deviation scores are computed by subtracting the grand mean of the variable across all groups from each subject's cell mean score. The between-cell correlations are then computed as those between these deviation scores and have g-2 degrees of freedom. In the ALS case, these correlations should be significant while the within-cell correlations are zero.

The hierarchical regression analysis used by Katerberg and Hom (1981) also accomplishes a partitioning of the (predictor) variance into between-group and within-group sources. This partitioning is accomplished by assigning a group's mean leadership scores to each of the members in the group. The criteria (unaggregated) are regresed on these mean scores, and the squared multiple correlation ($R^2$) computed for each criterion serves as an estimate of the criterion variance accounted for by between leader effects.

In the second step of the regression the individual (raw) leadership scores are entered into the equation. The increment to $R^2$ (the squared multiple partial correlation) represents the amount of criterion variance explained by within-group effects. The underlying logic is that the total $R^2$ between criteria and raw leadership scores is composed of within-group and between-group variancae. Partialling between-group effects from total effects, then, should leave only within-group effects Instead of debating the statistical assumptions of each model, both are presented here for comparison.

## RESULTS

Table 1 lists the means, standard deviations, reliabilities, and correlations among all (raw) study variables. The reliability estimates indicate a generally acceptable level for all variables. The correlation between the LBDQ Consideration and Initiating Structure scales, and those among the LBDQ scales and employee outcome variables are of a magnitude typically reported in studies using the LBDQ. In addition, the general pattern of convergence between the MBS and the LBDQ scales is as expected (Yukl, 1981).

### WABA Analysis

Table 2 displays the within-cell and between-cell correlations computed from deviation scores as described above. It is entirely possible, and indeed plausible, that the ALS model is the more appropriate for one leadership style-outcome relationship, while the VDL model may be the more appropriate for another relationship. Therefore, one should compare the within-cell correlation with the between-cell correlation for each predictor-outcome pair. Table 2 is arranged to facilitate such an inspection. In two cases the between-cell correlation was significantly different from zero ($p < .05$) while the corresponding within-cell correlatin was not. By this benchmark the ALS model appears appropriate regarding the relationship between leader consideration (as measured by the MBS) and both role conflict and satisfaction with coworkers. However, in neither of these cases are the correlations (within and between) significantly different from each other. On the other hand, there are four cases in which the within-cell correlation is significant and the between-cell correlation is not. This condition holds for the relationships between leader consideration (as measured by the MBS and the LBDQ) and the employee outcomes of role ambiguity and organizational commitment. In the particular case of the correlations between the LBDQ consideration scale and commitment, the within-cell correlation is significantly ($z = 2.10$, $p < .05$) higher than the between-cell correlation.

In five of the remaining relationships a general null condition exists. That is, there is simply no evidence for a relationship between a particular leadership variable and an outcome. In the remaining 19 relationships, however, there exists what Yammerino et al. (1980) refer to as a "special null" condition in which neither the ALS nor the VDL model is more appropriate. It has been argued that this condition indicates that an individual level of analysis is most appropriate, rather than the group level (ALS) or dyadic level (VDL) (Dansereau & Dumas, 1977; Dumas, 1977; Markham, 1978).

While the preceding analysis follows the procedures outlined by Yammerino et al. (1980) and Dansereau and Dumas (1977), another WABA approach is to examine the multiple within and between correlations. This approach would seem more appropriate in the present case because there are 6 different leadership variables (which are correlated with each other) and 5 criterion variables (also intercorrelated). The full table of simple correlations surely contains a fair amount of redundancy and probably some capitalizing on chance. Thus Table 3 displays the $R^2$'s for each criterion and for each set of leadership variables (MBS vs. LBDQ). For these regressions, all criteria and predictors are deviation scores as in the zero-order WABA analysis. Inspection of Table 3 indicates two things. First, for both leadersip measures and for every criterion, a significant amount of systematic between-leader and within-leader variance is explained. Secondly, in most (7 out of 10) cases the between-leader effects are greater than the within-leader effects, and are more than twice as big in 4 of the cases.

In summary, there clearly is evidence that leader behaviors are associated with employee outcomes both across leaders and within leader groups. These results are quite consistent whether leader descriptions come from the LBDQ or the MBS, and in that sense are not entirely "instrument bound."

Multiple Regression Analyses on Unaggregated Criteria

As described above, another way to partition variance in leadership effects is to partial the average leadership scores from the unaggregated individual-level criterion scores. This approach was the one used by Katerberg and Hom (1981).

Table 4 lists the results of the hierarchical multiple regressions in which each (unaggregated) dependent variable was regressed on the group mean leadership scores in the first step, and on the group means and individual leadership scores in the second step. For comparative purposes, the regressions were computed separately for the MBS and the LBDQ scales. In every case a significant amount of subordinate outcome variance is associated with differences in leadership styles both across leaders and across individuals within each leader's group. This conclusion holds whether the LBDQ or the MBA scales are used as predictors. The magnitudes of the within and between groups effects are fairly equal except in the case of satisfaction with supervision, where the between-group effects are consistently somewhat larger.

## DISCUSSION

The present study was designed to compare ALS and VDL leadership models by partitioning the total variance of subordinate perceptions of leadership style into within-group and between-groups variance. Using within and between analysis (WABA) and hierarchical multiple regression methods, both components of leadership variance were related to employee outcome variables. The general conclusion from both analytic methods is that a significant amount of employee outcome varianace is explained by both differences among leaders and differences within leaders across subordinates. These findings replicate results reported by Katerberg and Hom (1981) regarding LBDQ relationships, and also demonstrate that the same effects result when analogous leadership style variables are measured with the MBS.

While the two analytic methods produced similar general conclusions in the present study, they differ nevertheless, in how they treat the dependent variable, and, therefore, how they estimate effect sizes. The hierarchical regression technique uses the unaggregated scores on employee outcome variables as the dependent variables. In other words, it treats individual reactions to leadership as the criteria to be explained. We would argue that these individual reactions are what interest both leadership researchers and practitioners. In order to estimate the effects of within-group leadership variance, the between-groups variance in leadership (group mean scores) is partialled from individual-level scores. In contrast, the WABA method not only partials out between-groups variance in leadership (through aggregation and differencing), but also removes between-groups variance in the criterion by using deviation scores. What this "double partialling" leads to is an apparent overestimation of effect size. For example, in Table 3 total MBS-explained variance in the JDI supervision scale is reported as .62 (.39 from between-groups and .23 from within-groups). In fact, these four MBS scales do not account for 62% of the total variance in subordinate's satisfaction with supervision. Rather, of the JDI supervision variance that is due to differences among workgroups, 39% is associated with between-groups variance in MBS scores. In order to know how much of the total JDI supervision variance is explained by between-groups leadership effects one would have to multiply the .39 figure by the proportion of total JDI variance that is due to differences among groups. While this proportion can be determined from the raw data, it is not readily provided by the WABA analysis. On the other hand, the hierarchical regression method provides all of these estimates routinely, and thus appears to be the more useful approach.

In terms of VDL and ALS, the results indicate that both models contain elements of truth. The significant between-groups effects suggest that there are overall differences among leaders. In other words, the "average" style of a leader is predictive of the individual reactions of his or her subordinates. Similarly, how a leader is differentially perceived by subordinates is also predictive of individual subordinate reactions. The results of the present study indicate that these effects are roughly equivalent. However, a strict comparison of the two effects is somewhat hampered by the probable confounding of within-group effects and common methods variance. In that regard, it would be instructive to replicate and extend the present study with individual-level outcome variables (such as turnover, absenteeism, grievances, etc.) which would not share methods variance with the leadership measures).

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Table 1
Descriptive Statistics and Correlations
Among Study Variables

| | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Consideration (MBS) | 3.85 | .81 | (.64) | .44 | .23 | .22 | .71 | .29 | -.18 | -.18 | .53 | .14 | .10 |
| 2. Decision Participation (MBS) | 2.99 | .87 | | (.72) | .21 | .12 | .45 | .08 | -.04 | .02 | .29 | .11 | .03 |
| 3. Goal-Setting (MBS) | 3.11 | .99 | | | (.79) | .54 | .38 | .54 | -.11 | -.39 | .36 | .28 | .27 |
| 4. Role Clarification (MBS) | 3.45 | .87 | | | | (.70) | .30 | .68 | -.23 | -.40 | .28 | .19 | .26 |
| 5. Consideration (LBDQ) | 3.54 | .60 | | | | | (.83) | .43 | -.30 | -.25 | .59 | .35 | .26 |
| 6. Initiating Structure (LBDQ) | 3.74 | .54 | | | | | | (.86) | -.26 | -.53 | .34 | .21 | .34 |
| 7. Role Conflict | 2.59 | .79 | | | | | | | (.85) | .41 | -.23 | -.22 | -.37 |
| 8. Role Ambiguity | 2.31 | .80 | | | | | | | | (.89) | -.25 | -.15 | -.33 |
| 9. JDI Supervision | 38.78 | 8.56 | | | | | | | | | (.76) | .37 | .22 |
| 10. JDI Co-workers | 43.61 | 10.71 | | | | | | | | | | (.85) | .35 |
| 11. Commitment | 3.58 | .71 | | | | | | | | | | | (.94) |

NOTE: Reliabilities are reported in parentheses along the main diagonal.

N = 339

Table 2
WABA Zero-order Correlations

| | Role Conflict | Role Ambiguity | JDI Supervision | JDI Coworkers | Organizational Commitment |
|---|---|---|---|---|---|
| Consideration (MBS) | -.26** (-.09) | -.14 (-.20)* | .55* (.42)** | .18* (.11) | -.06 (.16)* |
| Decision Participation (MBS) | -.02 (-.07) | .08 (-.08) | .30** (.20)* | .08 (.10) | -.08 (.10) |
| Goal-Setting (MBS) | -.13 (-.08) | -.30** (-.36)** | .40** (.32)** | .32** (.20)* | .32** (.22)* |
| Role Clarification (MBS) | -.23* (-.24)** | -.45** (-.32)** | .27** (.30)** | .18* (.19)* | .30** (.23)** |
| Consideration (LBDQ) | -.31** (-.24)** | -.16 (-.26)** | .56** (.50)** | .33** (.32)** | .09 (.34)** |
| Initiating Structure (LBDQ) | -.26** (-.23)** | -.47** (-.47)** | .40** (.26)** | .19* (.21)* | .30** (.34)** |

Note: For each predictor-outcome pair the between-cell r is on top and the within-cell r is below it in parentheses.

For all between-cell r's, df =g-2 = 86.

For all within-cell r's, df = N-g-1 = 250.

Table 3
Multiple Within and Between Correlations
by Leadership Measure

| | Criterion Variable | | | | |
|---|---|---|---|---|---|
| | Role Conflict | Role Ambiguity | JDI Supervision | JDI Coworkers | Organizational Commitment |
| Between MBS $R^2$ | .11 | .24 | .39 | .12 | .15 |
| Within MBS $R^2$ | .05 | .16 | .23 | .05 | .07 |
| Total MBS $R^2$ | .16 | .40 | .62 | .17 | .22 |
| Between LBDQ $R^2$ | .12 | .22 | .33 | .09 | .09 |
| Within LBDQ $R^2$ | .06 | .22 | .24 | .10 | .15 |
| Total LBDQ $R^2$ | .18 | .44 | .57 | .19 | .24 |

Note: All $R^2$'s are significant at $p < .01$.
All independent and dependent variables are deviation scores.

Table 4
Hierarchical Multiple Regressions with
Unaggregated Dependent Variables

| | Dependent Variable | | | | |
|---|---|---|---|---|---|
| | Role Conflict | Role Ambiguity | JDI Supervision | JDI Coworkers | Organizational Commitment |
| MBS scales | | | | | |
| Mean leadership scores $R^2$ | .04[a] | .12 | .21 | .06 | .05 |
| Addition to $R^2$ for individual variables | .04[b] | .11 | .14 | .04 | .04 |
| Total $R^2$ | .08 | .23 | .35 | .10 | .09 |
| LBDQ scales | | | | | |
| Mean leadership scores $R^2$ | .07[c] | .14 | .21 | .06 | .04 |
| Addition to $R^2$ for individual variables | .03[d] | .15 | .14 | .08 | .10 |
| Total $R^2$ | .10 | .29 | .35 | .14 | .14 |

Note: All $R^2$ values are significant at $p < .01$

[a] Df for each value in this row are 4 and 334

[b] Df = 4 and 330

[c] Df = 2 and 336

[d] Dt - 2 and 334

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

LIST 4
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Naval Material Command
Management Training Center
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1421 Jefferson Davis Highway
Arlington, VA 20360

Naval Material Command
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Washington, DC 20360

Naval Material Command
NAVMAT-00KB
Washington, DC 20360

Naval Material Command
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Arlington, VA 20360

NPRDC

Commanding Officer (3 Copies)
Naval Personnel R&D Center
San Diego, CA 92152

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

Naval Personnel R&D Center
San Deigo, CA 92152
Dr. Robert Penn (1 copy)
Ed Aiken (1 copy)

LIST 7
HRM

Officer in Charge
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Alameda, CA 94591

Officer in Charge
Human Resource Management Detachment
Naval Submarine Base New London
P.O. Box 81
Groton, CT 06340

Officer in Charge
Human Resource Management Division
Naval Air Station
Mayport, FL 32228

Commanding Officer
Human Resource Management Center
Pearl Harbor, HI 96860

Commander in Chief
Human Resource Management Division
U.S. Pacific Fleet
Pearl Harbor, HI 96860

Officer in Charge
Human Resource Management Detachment
Naval Base
Charleston, SC 29408

Commanding Officer
Human Resource Management School
Naval Air Station Memphis
Millington, TN 38054

Human Resource Management School
Naval Air Station Memphis (96)
Millington, TN 38054

List 7 (Continued)

Commanding Officer
Human Resource Management Center
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Arlington, VA 22209

Commanding Officer
Human Resource Management Center
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Norfolk, VA 23511

Commander in Chief
Human Resource Management Division
U.S. Atlantic Fleet
Norfolk, VA 23511

Officer in Charge
Human Resource Management Detachment
Naval Air Station Whidbey Island
Oak Harbor, WA 98278

Commanding Officer
Human Resource Management Center
Box 23
FPO New York 09510

Commander in Chief
Human Resource Management Division
U.S. Naval Force Europe
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Officer in Charge
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Officer in Charge
Human Resource Management Detachment
COMNAVFORJAPAN
FPO Seattle 98762

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Sequential by State/City

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78u452-883

LIST 5
BUMED

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

Navy Medical R&D Command
ATTN: Code 44
National Naval Medical Center
Bethesda, MD 20014

LIST 6
NAVAL ACADEMY AND NAVAL POSTGRADUATE SCHO

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. James Arima
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Monterey, CA 93940

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

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

Professor Carson K. Eoyang
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Department of Administration Sciences
Monterey, CA 93940

Superintendent
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Naval Academy, U.S.
Annapolis, MD 21402

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Sequential by State/City

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## LIST 8
## NAVY MISCELLANEOUS

Naval Military Personnel Command (2 copies)
HRM Department (NMPC-6)
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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
NAS Memphis (75)
Millington, TN 38054

Navy Recruiting Command
Head, Research and Analysis Branch
Code 434, Room 8C01
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 MPI-20
Washington, DC 20380

Headquarters, U.S. Marine Corps
ATTN: Dr. A. L. Slafkosky,
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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

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Sequential by State/City

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LIST 13
AIR FORCE

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

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Head, Department of Behavioral
Science and Leadership
U.S. Air Force Academy, CO 80840

MAJ Robert Gregory
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AFOSR/NL (Dr. Fregly)
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Department of the Air Force
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Pentagon
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Technical Director
AFHRL/MO(T)
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AFMPC/MPCYPR
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LIST 12
ARMY

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Army Research Institute
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Director
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Director
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END

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