Senior Leadership: An Annotated Bibliography of Research Supported by the Army Research Institute

Stephen J. Zaccaro

George Mason University

Research and Advanced Concepts Office
Michael Drillings, Acting Director

May 1996

DTIC QUALITY INSPECTED 4

19960813 128

United States Army
Research Institute for the Behavioral and Social Sciences

U.S. ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES

**A Field Operating Agency Under the Jurisdiction
of the Deputy Chief of Staff for Personnel**

EDGAR M. JOHNSON
Director

Research accomplished under contract
for the Department of the Army

George Mason University

REPORT DOCUMENTATION PAGE

1. REPORT DATE 1996, May	2. REPORT TYPE Interim	3. DATES COVERED (from. . . to) January 1993-September 1994

4. TITLE AND SUBTITLE Senior Leadership: An Annotated Bibliography of Research Supported by the Army Research Institute	5a. CONTRACT OR GRANT NUMBER MDA903-93-C-0005
	5b. PROGRAM ELEMENT NUMBER 0601102A
6. AUTHOR(S) Stephen J. Zaccaro (George Mason University)	5c. PROJECT NUMBER B74F
	5d. TASK NUMBER 4901
	5e. WORK UNIT NUMBER C77

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) George Mason University 4400 University Drive Fairfax, VA 22020	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences ATTN: PERI-BR 5001 Eisenhower Avenue Alexandria, VA 22333-5600	10. MONITOR ACRONYM ARI
	11. MONITOR REPORT NUMBER Research Note 96-67

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

COR: Michael Drillings

14. ABSTRACT *(Maximum 200 words)*:

This report presents an annotated bibliography of research on senior leadership sponsored by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) primarily between 1985 and 1994. this research has covered themes related to the nature of work and performance requirements at the executive level; the knowledge, skills, abilities, and other characteristics needed to meet these requirements; the measurement of key senior leadership constructs; and the formulation of development and training technologies for the inculcation of requisite leadership qualities. An examination of the parameters of this research indicates that (1) as a whole, this research has proceeded from a single coherent theoretical framework; (20 more than one half of the products in this research base (63%) can be characterized as nonempirical; (3) one half of the empirical studies (50%) utilized primarily a qualitatively or descriptive research methodology; and (4) the nature of senior leadership work and requisite KSAOs has received more attention (53% and 58%, respectively, of the entries) than measurement (23%) or specific development and training strategies (44%). The annotated bibliography presented here serves as the initial step in a critical analysis and review of the research on senior leadership generated by ARI.

15. SUBJECT TERMS

Senior leadership	Executive	Expert systems	Measurement technologies	Leadership skills

SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON (Name and Telephone Number)
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified	Unlimited	39	

i

Abstract

This report presents an annotated bibliography of research on senior leadership sponsored by Army Research Institute primarily between 1985 and 1994. This research has covered themes related to the nature of work and performance requirements at the executive level, the knowledge, skills, abilities, and other characteristics needed to meet these requirements, the measurement of key senior leadership constructs, and the formulation of development and training technologies for the inculcation of requisite leadership qualities. An examination of the parameters of this research indicates that (a) as a whole, this research has proceeded from a single coherent theoretical framework; (b) more than half of the products in this research base (63%) can be characterized as nonempirical; (c) one half of the empirical studies (50%) utilized primarily a qualitatively or descriptive research methodology; and (d) the nature of senior leadership work and requisite KSAOs has received more attention (53% and 58%, respectively. of the entries) than measurement (23%) or specific development and training strategies (44%). The annotated bibliography presented here serves as the initial step in a critical analysis and review of the research on senior leadership generated by Army Research Institute.

Table of Contents

List of Tables

Senior Leadership: An Annotated Bibliography of Research
Sponsored by Army Research Institute

Background

In the early 1980s the U.S. Army recognized a need for greater and more focused research on the nature of leadership at the brigade command level and higher. Some particularly critical concerns were the identification of leader performance requirements, requisite skills, and developmental interventions targeting those skills. As a consequence of this recognition, U. S. Army Research Institute (ARI) established the Executive Development Research Group (EDRG) under the direction of T. Owen Jacobs and located within the Manpower and Personnel Research Laboratory. This area later became the Strategic Leadership Technical Area (SLTA). The mission of the EDRG was "to develop and test concept materials for doctrine development at the executive level, formulate an executive development system, and formulate and test methodology for restructuring Army organizations to achieve gains in productivity, effectiveness, and esprit" (Johnson, 1987, p. v).

This mission has resulted in an extensive research program that has focused on several themes. The first was the nature of executive-level work within the Army, and particularly how work and performance requirements changed across organizational levels. A second theme was the identification of individual capacities, knowledge, skills, abilities, and other qualities that were associated with the successful completion of executive work requirements. Given that the nature of work changes at different executive or organizational levels, then the requisite individual qualities should also change. A third theme was the development of measurement technologies to assess individual characteristics identified as necessary for effective executive leadership. The fourth, and perhaps most important theme, is the formulation of both targeted and system-wide developmental interventions and technologies to facilitate the acquisition of requisite executive leadership skills.

After approximately 10 years of research centered around these major themes,

there is a need to evaluate the advances and contributions made to an understanding of executive leadership and its development. Accordingly, ARI has directed that a review and critical analysis be completed of research they have sponsored on senior leadership. The purpose of this review is to provide a theoretical and empirical synthesis of Army research on senior leadership, compare and integrate this work with other research on organizational leadership, and identify the necessary future directions for research in this area.

The first step in this review and critical analysis is to compile and organize the various research projects and products that were completed through ARI and had the aforementioned themes as their central focus. Research sponsored by ARI on senior leadership has been completed through various applied and basic research programs, by in-house and contracted personnel, and within military, civilian, or joint settings. The purpose of the present report is to identify and summarize this research in an annotated bibliography.

Literature Search, Acquisition and Coding

The initial step in this project was to find all possible research products that could merit inclusion in the annotated bibliography. These products were acquired through several means. First, a number of them were transmitted by personnel working within the SLTA (e.g., T. Owen Jacobs, Steve Stewart). Second, a thorough search was completed through the computerized data bases in the ARI library. Key words used to guide this search were "senior leadership", "strategic leadership", "executive leadership", as well as the authors of several of the relevant individual research programs sponsored by ARI (e.g., Jacobs, Jaques, Stamp, Stewart, Markessini, Lucas, Harris, Mumford, and Lewis). Third, the reference list of each paper and product acquired in the search was reviewed to identify other key sources. Fourth, members of the research team held discussions with ARI personnel who were potentially familiar with the components of the research program on

2

senior leadership, as well as with personnel at contracted organizations (e.g., CAE-Link, Management Research Institute). For example, an interview with Edwin Fleishman produced several technical reports (e.g., Mumford, 1986; Mumford, Yarkin-Levin, Korotkin, Wallis, & Marshall-Mies, 1986) completed at his company (i.e, Advanced Research Resources Organization) that provided the basis for more recent work on senior leadership sponsored by ARI (Mumford, Zaccaro, Harding, & Fleishman, (under review); Mumford, Zaccaro, Harding, Fleishman, & Reiter-Palmon, 1993). The final source of potential research products was an informal report by Jacobs (1993) that summarized current and future research directions by SLTA. This report was reviewed to identify products not readily apparent in other sources (e.g., Zsambok, 1993; Zsambok, Klein, Kyne, & Klinger, 1992).

This effort produced an extensive reference list of technical and research reports, journal articles, books, conference proceedings, instructional guides and other products that could qualify for inclusion in the annotated bibliography. This list was then reviewed and articles were selected for annotation according to three criteria. First, the focus of the work had to be on senior organizational leadership. This was operationalized in the Army, for example, as leadership at the brigade level or higher (colonel through four-star general officer). Thus, studies on junior army leadership that focused primarily on the nature, skills, and development of noncommissioned and commissioned officers up to the rank of major or colonel (e.g., Harman, Tremble, & Goodwin, 1993; Smith, 1988; Steinberg & Leaman, 1990a,b; Tremble & Alderks; Twohig, Rachford, Savell, & Rigby, 1987) were not included for annotation. However, some studies that did examine officers at and below the rank of colonel were included because their primary purpose was to enhance understanding of senior level leadership in part by using junior officers as a comparison group (e.g., Mumford, et al., 1993; Mumford, et al., in press). Likewise, other studies using samples of college students were included because their purpose was to test concepts and developmental techniques linked to the development of

senior leaders (e.g., McIntyre, Jordan, Mergeb, Hamil, & Jacobs, 1993; Mumford, Baughman, Supinski, Costanza, & Threlfall, 1993; Stewart & Angle, 1992).

The second criterion for inclusion in the bibliography was that the work was sponsored by ARI. This led to the inclusion of several book chapters and journal articles by both in-house and contracted personnel (e.g., Jacobs & Jaques, 1987; 1990; Jaques, 1986; Lewis & Jacobs, 1992; Stamp, 1986) in addition to ARI technical reports. This criterion also resulted in the inclusion of a book on strategic leadership by Phillips and Hunt (1992) because it summarized contributions to a conference on this topic that was jointly sponsored by ARI and the U.S. Army War College. However, several other works were excluded because they were not apparently sponsored by ARI although their connection to the framework of ARI research was unmistakable (e.g., Jaques, 1989; 1990a,b,c).

The third criterion was that the work occurred since the establishment within ARI of EDRG and SLTA (i.e., 1985 - 1994). This was because the major purpose of this review is to examine the research on senior leadership produced under the aegis of these groups. However, some notable papers were included in the annotated bibliography that were produced outside of this time frame and/or under the direction of the Leadership and Management Technical Area because they had clear and direct linkages to subsequent research produced by EDRG and SLTA (e.g., Haythorn, Kimmel, & Steinberg, 1985; Jacobs, 1983, 1985; Hunt, Osborn, & Martin, 1981; Mumford, 1986; Mumford, et al., 1986). Research on military and nonmilitary senior military that was produced before the 1980s was summarized in an annotated bibliography by Kimmel (1981), the parameters of which were reviewed by Haythorn, et al., (1983). Indeed, that bibliography serves as a useful comparison to the present work.

The application of these criteria to the original list of research products produced 43 papers for inclusion in the bibliography. Each of these products was reviewed and annotated. The contents of these articles were also coded for two key

research parameters. One parameter was whether the research product was a literature review, a theoretical/conceptual piece, an empirical study, or an instructional guide. Each study was assigned a number from 1 to 4, corresponding to these types. Further, empirical studies were coded with a letter according to their methodology; that is, they were coded according to whether they used an experimental (a), correlational (b), survey (c) or interview (d) methodology. Research products were also coded according to whether they covered one or more of four research themes. These were the nature of work, roles, functions, and performance requirements at senior or executive leadership levels; the individual knowledge, skills, abilities, and other characteristics (KSAOs) associated with effective senior leadership; the measurement of these KSAOs as well as other key senior leadership concepts; and the development and training of senior leadership. The latter category contained both theories of leader development and expositions of developmental technology. Each study was assigned a number from 1 to 4, corresponding to these themes.

Parameter codes were attached in parentheses at the end of each annotation in the bibliography. The notation was in the following form:

$$(X_a/X_b),$$

where X_a refereed to the code (1 - 4, a - d) denoting the type of research and X_b referred to the code (1 - 4) denoting study themes. Because research products may contain multiple approaches and themes, these notations often contain multiple codes.

The annotated bibliography along with parameter codes is shown in Appendix A. Entries in the bibliography were arranged alphabetically. The next section of this report describes the parameters of this research literature

Parameters of ARI Research on Senior Leadership

The number of research products summarized in the annotated bibliography

5

clearly attests to the increased interest in military senior leadership by the U.S. Army and ARI. In his annotated bibliography of earlier senior leadership research, which covered a span of 43 years (1938 to 1981), Kimmel (1981) identified only 22 studies concerning senior leadership in military organizations. The present bibliography indicates nearly twice the number of such studies in approximately a quarter of the time. Kimmel's review also revealed an eclectic literature base without a common theoretical or conceptual framework. The work at ARI has been consciously grounded in the conceptual framework provided by Jaques's Stratified Systems Theory (SST; Jacobs & Jaques, 1987; Jaques, 1986; Jaques & Clement, 1991) (indeed, some of the sponsored work contributed directly to further evolution and refinement of this theory). Twenty-six of the 43 entries (60.5%) were explicitly or derivatively based on SST. While this has the advantage of providing a coherent framework for research on senior leadership, a quality often lacking in other research on such leadership, the strengths and weaknesses of this research program are in large part linked to the strengths, scope, and possible weaknesses of SST.

Table 1 summarizes the characteristics of the research products included in the bibliography. The frequencies of products are indicated by topic area and by the approach of the study. Of the 43 papers in the bibliography, 8 (19%) were reviews of the literature; at least 2 reviews were found for each of the research themes. Fifteen products (35%) were theoretical or conceptual in nature. Most of these covered 2 or more of the topic areas. The topics covered in these conceptual papers in order of frequency were leader KSAOs (13 or 30% of the total products in the bibliography); leader roles and functions (9 or 21%); development and training (6 or 14%) and measurement (2 or 5%).

Sixteen entries in the bibliography (37%) referred to empirical research products. Eight, or half of these studies (50%), used experimental or correlational methodologies. The remainder used either survey or structured interview methodologies. Five of the experimental and correlational studies focused on

Table 1

Characteristics of Research on Senior Leadership by Army Research Institute: Number of Studies Aggregated by Type of Study and Topic Area

Type of Paper	Total	Topic Area			
		Leader Roles	Leader KSAOs	Measurement	Development and Training
Literature Review	8	5	3	2	2
Theoretical/Conceptual	15	9	13	2	6
Empirical					
Experimental	2		1		2
Correlational	6	1	1	5	1
Survey	1				1
Interview	7	5	4		5
Instructional	4	2	3	1	2
Total	43	23	25	10	19

Note: A study may cover multiple topics and/or include multiple empirical studies with different methodologies; in such cases the study was included in more than one category. Thus, the frequency of studies presented in this table is more than the number of studies noted in the first column.

7

measurement issues while 3 focused on development and training approaches. The remaining 3 studies were concerned with leader roles and KSAOs. Alternatively, 5 of the interview and survey studies concerned leader roles, 4 also covered leader KSAOs, and 6 examined measurement and leader training and development.

Four entries were instructional guides that were prepared by both in-house and contracted personnel for general use in the U.S. Army or for courseware at the Army War College and the Industrial College of the Armed Forces. One or more of these guides covered each of the research themes.

Taken together, these data suggest the following general characteristics and conclusions about this research base:

1. The research base as a whole has been grounded in a coherent theoretical framework, i.e, Jaques's Stratified Systems Theory.

2. More than half of the products in this research base (63%) can be characterized as nonempirical (i.e., literature reviews, theoretical/conceptual papers, or instructional guides).

3. One half of the empirical studies (50%) utilized primarily a qualitatively or descriptive research methodology.

4. The nature of senior leadership work and requisite KSAOs has received more attention (53% and 58% respectively of the entries) than measurement (23%) or specific development and training strategies (44%).

Summary

This report presents an annotated bibliography of research on senior leadership sponsored by Army Research Institute primarily between 1985 and 1994. The work represents a significant jump in quantity over previous research on senior military leadership. This research has covered themes related to the nature of work and performance requirements at the executive level, the knowledge, skills, abilities, and other characteristics needed to meet these requirements, the measurement of key senior leadership constructs, and the formulation of development and training technologies for the enhancement of requisite leadership qualities. Further, this work has proceeded primarily from a coherent theoretical framework. The annotated bibliography presented here serves as the initial step in a critical analysis and review of the research on senior leadership generated by Army Research Institute.

References

Harman, J. Tremble, T. R., Jr., & Goodwin, G. F. (1993). *Junior leader development in Army units*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Haythorn, W. W., Kimmel, M., & Steinberg, A. G. (1985). Senior leaders on the future battlefield. In J. G. Hunt & J. D. Blair (Eds.), *Leadership on the future battlefield*. Washington: Pergamon-Brassey's.

Hunt, J. G., Osborn, R. N., & Martin, H. J. (1981). *A multiple influence model of leadership* (Tech. Rep. No. 520). Alexandria, VA: U.S. Army Research Institute.

Jacobs, T. O. (1983). Cognitive behavior and information processing under conditions of uncertainty. In R. F. Williams and R. D. Abeyta (Eds.), *Management of risk and uncertainty in systems acquisition: Proceedings of the defense risk and uncertainty workshop*. Fort Belvoir, VA: Army Procurement Research Office.

Jacobs, T. O. (1985). The AirLand battle and leadership requirements. In J. G. Hunt & J. D. Blair (Eds.), *Leadership on the future battlefield*. Washington: Pergamon-Brassey's.

Jacobs, T. O. (1993). *A program of leadership research*. Unpublished report.

Jacobs, T. O., & Jaques E. (1987). Leadership in complex systems. In J. A. Zeidner (Ed.), *Human productivity enhancement (Vol. 2, Organizations, personnel, and decision making)*. New York: Praeger, 7-65.

Jacobs, T. O., and Jaques E. (1990). Military executive leadership. In K. E. Clark and M. B. Clark (Eds.), *Measures of leadership*. Greensboro: Center for Creative Leadership.

Jaques, E. (1986). The development of intellectual capability: A discussion of Stratified Systems Theory. *Journal of Applied Behavioral Science, 22*, 361-384.

Jaques, E. (1990). Task complexity. in E. Jaques (Ed.), *Creativity and work*. Madison, Ct: International Universities Press.

Jaques, E. (1990). Cognitive complexity. in E. Jaques (Ed.), *Creativity and work*. Madison, Ct: International Universities Press.

Jaques, E. (1990). Maturation of cognitive power. in E. Jaques (Ed.), *Creativity and work*. Madison, Ct: International Universities Press.

Jaques, E. (1989). *Requisite organization: The CEO's guide to creative structure and leadership*. Arlington, VA: Cason Hall.

Jaques, E., & Clement, S. D. (1991). *Executive leadership: A practical guide to managing complexity*. Arlington, VA: Cason Hall.

Johnson, E. M. (1987). Forward. In S. R. Stewart and J. M. Hicks, *Leader development training assessment of U.S. Army Training and Doctrine Command (TRADOC) brigadier commanders* (ARI Research Report 1454). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Kimmel, M. J. (1981). *Senior leadership: An annotated bibliography of the military and nonmilitary literature*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Lewis, P., & Jacobs, T. O. (1992). Individual differences in strategic leadership capacity: A constructive/development view. In R. L. Phillips & J. G. Hunt (Eds.), *Strategic leadership: A Multiorganizational Perspective*, (pp. 121-137).

McIntyre, R. M., Jordan, P., Mergeb, C., Hamil, L., & Jacobs, T. O. (1993). *The construct validity of the CPA: Report on three investigations*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Mumford, M. D. (1986). *Leadership in the organizational context: A conceptual approach and its application*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Mumford. M. D., Baughman, W. A., Supinski, Costanza, D. P., & Threlfall, K. V. (1993). *Cognitive and metacognitive skill development: Alternative methods for predicting leadership potential*. Bethesda, MD: Management Research Institute.

Mumford, M. D., Yarkin-Levin, K., Korotkin, A. L., Wallis, M. R., and Marshall-Mies, J. (1986). *Characteristics relevant to performance as an Army leader:*

Knowledge, skills, aptitudes, other characteristics and generic skills.
Bethesda, MD: Advanced Research Resources Organization.

Mumford, M. D., Zaccaro, S. J., Harding, F. D., Fleishman, E. A., & Reiter-Palmon, R. (1993). *Cognitive and temperament predictors of executive ability: Principles for developing leadership capacity.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Mumford, M. D., Zaccaro, S. J., Harding, F. D., & Fleishman, E. A. (under review). *The thinking leader: Developing leaders for a more complex world.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Phillips, R. L., & Hunt, J. G. (1992). Strategic leadership: A multiorganizational-level perspective. Westport, Ct.: Quorum Books.

Smith, N. D. (1988). Exploratory examination of procedures for improving lieutenant leadership development. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Stamp, G. P. (1986). Some observations on the career paths of women. *Journal of Applied Behavioral Science, 22,* 385-396.

Steinberg, A. G., & Leaman, J. A. (1990). *Dimensions of Army commissioned and noncommissioned officer leadership.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Steinberg, A. G., & Leaman, J. A. (1990). *The Army leader requirements task analysis: Commissioned officer results.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Stewart, S. R., & Angle, D. C. (1992). *Correlates of creative problem solving.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Tremble, T. R., Jr., & Alderks, C. E. (1991). *Measures for research on small unit preparedness for combat effectiveness.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Twohig, P. T., Rachford, D. L., Savell, J. M., & Rigby, C. K. (1987). *Implementation of a cognitive skills training program in ROTC: The leadership enrichment program.* Alexandria, VA: U.S. Army Research

Institute for the Behavioral and Social Sciences.

Zsambok, C. E. (1993). *Advanced team decision making: A model and training implications*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Zsambok, C. E., Klein, G., Kyne, M. M., & Klinger, D. W. (1992). *Advanced team decision making: A developmental model*. Fairborn, OH: Klein Associates, Inc. Prepared for U. S. Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.

Institute for the Behavioral and Social Sciences.

Zsambok, C. E. (1993). *Advanced team decision making: A model and training implications*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Zsambok, C. E., Klein, G., Kyne, M. M., & Klinger, D. W. (1992). *Advanced team decision making: A developmental model*. Fairborn, OH: Klein Associates, Inc. Prepared for U. S. Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.

Appendix A

An Annotated Bibliography of Senior Leadership Research

Sponsored by the U. S. Army Research Institute

An Annotated Bibliography of Senior Leadership Research Sponsored by the U. S. Army Research Institute [1]

Baker, J. D., Harris, P. A., & Lucas, K. W. (1987). *Industrial simulation games for executive development: Review of the literature and implications for military implications.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

A computerized literature search was conducted to examine the use of simulation games as an executive development tool. This review indicated that simulation games are widely used in industry but typically applied to lower and mid-level managers. Thus, the applicability of simulations to executive development has not been sufficiently demonstrated. Also, there were little evaluation data regarding the benefits of simulations for learning. The authors offer a number of design principles derived from this literature to be considered in further research and development of Army executive development simulation tools (1/4).

Barber, H., & Jacobs, T. O. (1993). *Strategic leadership conference proceedings.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

In February of 1991, the Strategic Leadership Technical Area (SLTA) at ARI and U.S. Army War College sponsored a conference on strategic leadership. This book contains the proceedings from that conference. Speakers included Generals Maxwell Thurman, Edward Meyer, Louis Menetrey, and Gordon Sullivan. Also, John D, Rittenhouse, David Campbell, T. Owen Jacobs, and Calhoun Wick presented at this conference. Presentations focused on (a) the requirements and environment of strategic leadership, (b) the competencies that facilitate such leadership, and (c) the development of these competencies (2/1,2,4).

---

[1] The numbers in parentheses refer to the parameter codes assigned to each research product. The first number refers to type of study (1 = literature review, 2 = theoretical/conceptual piece, 3 = empirical study, 4 = instructional guide). The letter after this number refers to the methodology used if the product was an empirical study (a = experimental, b = correlational, c = survey, d = interview). The second number refers to the research themes covered in the study (1 = the nature of senior leadership work and performance requirements; 2 = individual knowledge, skills, abilities, and other characteristics associated with effective senior leadership; 3 = measurement issues; 4 = senior leadership development and training).

Department of the Army (1987). *Executive leadership (AR 600-80)*. Washington: U.S. Govt. Printing Office (see also the special text published for use at the U.S. Army War College).

This pamphlet is an instructional guide that presents information about the nature of executive leadership in the Army, the role and responsibilities of Army executives, the competencies associated with successful executive leadership, principles of organizational design to facilitate the work of executives, and leader development principles directed at the development of subordinates. The material in this pamphlet was developed from in-depth interviews with three- and four-star general officers (see Harris & Lucas, 1991; Jaques, Clement, Rigby, & Jacobs, 1986, in this bibliography). Also, a version of this pamphlet was prepared as a special text or courseware for use at the U.S. Army War College (4/1,2,4).

Department of the Army (in press). *Strategic leadership (new Field Manual 22-103)*. Washington, DC: U.S. Govt. Printing Office.

This field manual describes the tasks, environment, and competencies associated with strategic leadership in the Army. It also defines strategic vision and describes organizational culture which is managed by strategic leaders. This instructional guide was derived from prior research conducted by the Strategic Leadership Technical Area at ARI (4/1,2).

Geiwitz, J. (1993). *A conceptual model of metacognitive skills* (technical report 51-1 for ARI contract number MDA903-93-C-0109). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

This study examines the likely metacognitive skills possessed by successful executives. These skills were defined as "abilities to monitor and direct the operation of cognitive skills to obtain the greatest possible success" (p. 1), possessed by successful executives. Several theories of metacognitive skills are reviewed. The author then discusses ten such skills. These are the detection of a problem, representation of a problem, selection of a problem solving method, strategic application of problem-solving methods, evaluation of solution candidates, recognition of errors, resource allocation, temporal monitoring, social monitoring, and executive monitoring. Geiwitz integrates these skills into a model of how metacognitive skills influence technical problem solving. The paper concludes with a discussion of the training and assessment of metacognitive skills (2/2).

Harris, P., & Lucas, K. W. (1991). *Executive leadership: Requisite skills and developmental process for three- and four-star assignments*. Alexandria, VA:

U.S. Army Research Institute for the Behavioral and Social Sciences.

The authors interviewed 8 four-star and 33 three-star general officers to determined the nature of senior leadership in the Army and the requisite skills for such assignments. As suggested by Stratified Systems Theory, work by these general officers was characterized by multiple informal and formal reporting channels, an external orientation, and long planning time frames (with longer time spans for 4 star versus 3-star general officers). The major requisite knowledge and skills that were identified from the interviews included knowledge of the various national and international constituencies with whom the general officers were required to interact, consensus building and collegial relationship skills, envisioning, and abstract thinking. The authors also reviewed the developmental experiences of general officers (3d/1,2,4).

Haythorn, W. W., Kimmel, M., & Steinberg, A. G. (1985). Senior leaders on the future battlefield. In J. G. Hunt & J. D. Blair (Eds.), *Leadership on the future battlefield*. Washington: Pergamon-Brassey's.

The authors summarize the results of a review of the literature on senior leadership. A search of this literature yielded 135 contributions. Senior leadership was depicted as involving decision making and problem solving, interpersonal dynamics, extensive boundary spanning activities, and activities related to organizational planning and structuring. The authors also reviewed a number of studies specifying a number of senior leadership competencies (1/1,2).

Hunt, J. G., Osborn, R. N., & Martin, H. J. (1981). *A multiple influence model of leadership* (Tech. Rep. No. 520). Alexandria, VA: U.S. Army Research Institute.

This research examined discretionary leadership, defined as influence beyond that which is required by the role. Such leadership was proposed to be elicited by increases in environmental, structural, and contextual complexity. Measures of environmental conditions, contextual variables, structural variables, discretionary and required leadership, group and task variables, and outcome criteria were administered to noncommissioned and commissioned officers (ranging to lieutenant colonels) from 75 Army telecommunications centers. Canonical correlation analyses indicated that discretionary leadership was significantly associated with structural complexity, but not with environmental and contextual complexity. Also, discretionary leadership was correlated with performance and employee maintenance measures (e.g., job satisfaction, intent to leave). A series of moderated regression analyses indicated that a fit between discretionary behavior and levels of environmental, contextual, and structural complexity explained significant unique

variance in the criteria. These findings suggest support for the multiple influence model of leadership. The authors discuss implications for leader training design in the final sections of this report (3b/1).

Industrial College of the Armed Forces (1994). *A Guide to the Strategic Leader Development Inventory*. Washington D.C.: Industrial College of the Armed Forces

This monograph is an instructional guide to the Strategic Leader Development Inventory (SLDI) for use at the Industrial College of the Armed Forces. The SLDI is an instrument that is administered to the target leader as well as to his or her superiors, peers, and subordinates. It examines a leader's (or potential leader's) strength and weaknesses on 15 strategic leadership factors. This guide presents the theoretical foundations and empirical support for the SLDI, a description of the factors themselves, the requirements of strategic performance, and information on how to interpret feedback from the SLDI (4/2,3).

Jacobs, T. O. (1983). Cognitive behavior and information processing under conditions of uncertainty. In R. F. Williams and R. D. Abeyta (Eds.), *Management of risk and uncertainty in systems acquisition: Proceedings of the defense risk and uncertainty workshop*. Fort Belvoir, VA: Army Procurement Research Office.

The author reviews the literature on decision making under conditions of uncertainty, particularly by senior executives. This review indicates that senior executives engage in complex decision making characterized by (a) uncertainty, defined as situations in which possible outcomes are known, but not the probabilities associated with each outcome, and (b) information richness, or the information capacity of data sources. Senior leadership under such conditions is facilitated by an organizational form or structure that is suited to the information processing needs of such leaders, and by the cognitive skills of the leader (1/1).

Jacobs, T. O. (1985). The AirLand battle and leadership requirements. In J. G. Hunt & J. D. Blair (Eds.), *Leadership on the future battlefield*. Washington: Pergamon-Brassey's.

Future battlefield conditions are likely to be even more complex and uncertain than before because of three factors -- increased lethality of current and future weapons systems, increased capacity for more rapid battlefield mobility, and increased battlefield fluidity. Given these and other characteristics that will characterize future battle conditions, the author specifies a number of individual qualities required of future Army leaders. These include complex thinking skills, a

18

frame of reference regarding the operating rule system, initiative and foresight, technical competence, cohesion generation skills, capacity for autonomous action, flexibility and adaptability, capacity for innovative experimentation; ability to create an appropriate risk-taking environment for subordinate officers, and knowledge of power and politics (2/1,2).

Jacobs, T. O., & Jaques E. (1987). Leadership in complex systems. In J. A. Zeidner (Ed.), *Human productivity enhancement (Vol. 2, Organizations, personnel, and decision making)* . New York: Praeger, 7-65.

A central premise of this chapter is that prior leadership theories were limited in that they tended to focus primarily on interpersonal influence and on leadership at lower organizational levels. In contrast, the authors offer a theory of organizational leadership that is based on the perspective of organizations as bureaucratic structures having seven levels or strata. Each stratum specifies a set of critical tasks that must be completed by leaders at that level in order for them to be effective. Each stratum is characterized by greater complexity than the one below it. The seven strata are also characterized by different time spans in terms of work and planning focuses that range from 3 months (strata I and II) to 20 years (strata VII). These strata are organized further into three domains, specifically production (strata I, II, and III), organizational (strata IV and V), and systems (strata VI and VII). The authors propose skill requirements corresponding to the different levels of organizational task requirements. They also offer a set of basic constructs that specify the criteria for leadership effectiveness across organizational levels as well as for understanding leader development across these levels (2/1,2).

Jacobs, T. O., and Jaques E. (1990). Military executive leadership. In K. E. Clark and M. B. Clark (Eds.), *Measures of leadership*. Greensboro: Center for Creative Leadership.

This paper presents the theory of organizational leadership proposed by Jacobs and Jaques (1987). It also presents the results of two studies that provide support for this theory (see Harris & Lucas, 1991; Jaques, Clement, Rigby, & Jacobs, 1986; and Stamp, 1988 in this bibliography) (2/1,2,3).

Jacobs, T. O., and Jaques E. (1991). Executive leadership. In R. Gal and D. Mangelsdorf (Eds.), *Handbook of military psychology*. Chichester, U.K.: Wiley and Sons.

The authors present the theory of organizational leadership offered by Jacobs and Jaques (1987) and the results of interviews with three- and four-star general

officers (see Harris and Lucas, 1991; Jaques, Clement, Rigby, & Jacobs, 1986) that support premises from this theory. They also present a theory of military executive development that is derived from the aforementioned leadership theory. Successful executive development is grounded in the growth of the cognitive capacities necessary to facilitate performance in the increasing complex environments that characterize top organizational levels. Thus, such development depends upon an individual's capacity to develop requisite frames of reference, his or her proclivity to do the work required in this development, and exposure to relevant developmental opportunities (2/1,2,4).

Jacobs, T. O., & Lewis, P. (1992). Leadership requirements in stratified systems. In R. L. Phillips & J. G. Hunt (Eds.), *Strategic leadership: A Multiorganizational Perspective*, (pp. 15-25).

The authors present an overview of Stratified Systems Theory (SST; see Jacobs & Jaques, (1987) and Jaques (1986) in this bibliography). They discuss the requirement for leaders to address greater complexity at higher organizational levels and the cognitive and metacognitive skills associated with individual cognitive complexity. They conclude with a list of unresolved issues regarding SST (2/1,2).

Jaques, E. (1986). The development of intellectual capability: A discussion of Stratified Systems Theory. *Journal of Applied Behavioral Science, 22*, 361-384.

Jaques describes the concepts of Stratified Systems Theory (SST) and the development of cognitive and intellectual capability. Organizational work is divided into seven strata based upon time spans or horizons required by the work. An individual's cognitive power refers to the maximum time span he or she is able to work with. Jaques indicates that different strata require the following cognitive functions: concrete shaping (stratum I), task definition (stratum II), task extrapolation (stratum III), transforming systems (stratum IV), shaping whole systems (stratum V), defining whole systems in the world-wide environment (stratum VI), and extrapolative development of whole systems (stratrum VII). He presents a "quintave" theory of cognitive development suggesting that four cognitive functions, shaping, defining, extrapolation, and transforming, occur repeatedly in increasingly more complex environments. Jaques then examines the maturation of individual cognitive power and posits maturation curves based on an individual's increasing potential to complete the aforementioned cognitive functions. This work presents the basis for future theoretical and empirical work on SST (2/1,2).

Jaques, E. (1990). Three studies in Stratified Systems Theory. Appended to E. Jaques & G. Stamp, *Development of stratified systems theory for possible*

implementation in the U.S. Army. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The author reviews the results of three prior studies that provide support for Stratified Systems Theory. The first study (Richardson, 1971) examined the proposed relationship between time span of discretion, as reported by a person's supervisor, and the job incumbents' felt-fair pay. The results, from 180 respondents and their supervisors at multiple organizational levels at Honeywell Corporation, indicated that time span discretion was correlated .86 with felt-fair pair and .74 with actual pay. The second study (Homa, 1967) demonstrated in a sample of 179 men that job incumbents were aware of their level of work-related capacity, as well as the appropriateness of their work assignments and the fairness of their pay relative to that capacity. Further, this study supported the hypothesis that a regular pattern existed in the growth of individual capacity over time. The last study (Kohler, 1986) examined longitudinal data (10 - 20 yrs) from individuals on time span levels, perceived pay fairness, and judgements of the appropriate level of employment. The data supported the capability progression hypothesis derived from SST. Jaques argues that these three studies provide systematic support for hypotheses based on SST (1/1).

Jaques, E., Clement, S., Rigby, C., & Jacobs, T. O. (1986). *Senior leadership requirements at the executive level*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The authors summarize their findings from interviews with 68 senior military (3 and 4 star general officers) and civilian (SES) executives. The purpose of this research was (a) to characterize work and role requirements for executives; (b) specify the knowledge, skills, abilities, and other competencies and qualities necessary to address these requirements; (c) evaluate the developmental processes and events experienced by the executives before attaining their position; and (d) test Jaques's Stratified Systems Theory (SST). Military executive work was characterized primarily by joint command, an international perspective, political interactions and negotiations, resource acquisition and logistics, diffusion of command, and collegiality. SES work was observed as the equivalent of that of 2 star general officers. Civilian executives provide greater specialization and continuity than is characteristic of military executives. Senior leadership competencies included high level cognitive capability, military, logistical, political, and international knowledge, as well as skills in combat, negotiation, persuasion, collegial relations, culture building, organizational engineering, forces structuring, and planning and complex problem solving. Significant developmental processes experienced by general officers included coaching and mentoring, formal schooling, instructor assignments to Army schools, assignments requiring work significantly

above that of their own rank. Interviewees reported a need for higher level and more extensive development experiences for military and SES executives. The data summarized in this report supported derivations from Stratified Systems Theory regarding the nature of work at the topmost organizational levels and the individual competencies necessary to complete such work. The authors concluded with several prescriptions regarding leader performance appraisal and senior leadership developmental opportunities (3d/1,2,4).

Jaques, E., & Stamp, G. (1990). *Development of stratified systems theory for possible implementation in the U.S. Army.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The authors review the results of a three year research program sponsored by ARI on the development of Stratified Systems Theory (SST) and its application to understanding Army executive leadership. This program produced output regarding the organizational structuring of the Army (see Rigby & Harris (1987) in this bibliography), the nature of senior leadership work in the Army (see Jacobs & Jaques, 1987; Jaques, Clement, Rigby, & Jacobs, 1986), the assessment of officer potential (see Stamp, 1986, 1988), and theoretical development of SST (see Jaques, 1990; Stamp, 1990). Three studies are appended to this report (Jaques, 1990; Stamp, 1988, 1990) and are reported elsewhere in this bibliography (1/1,2,3).

Lewis, P. (1993). *Career Path Appreciation (CPA) data reduction and analysis.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

This is a psychometric examination of the Career Path Appreciation, a measure designed to assess an individual's work capacity. CPA interviews were conducted with 148 Army officers at the U.S. Army War College. Interrater reliability with two raters was .81. Also, two different ratings of conceptual thinking skills by War College instructors were correlated with scores on the CPA (r = .57 and .51). Finally, Lewis found that combining scores from portions of the CPA (i.e., the Phrases "Most" average and the Symbols total cards sorted) produced an psychometrically acceptable objective approach to scoring the CPA. The results of this study provide overall psychometric support for the CPA (3b,d/3).

Lewis, P., & Jacobs, T. O. (1992). Individual differences in strategic leadership capacity: A constructive/development view. In R. L. Phillips & J. G. Hunt (Eds.), *Strategic leadership: A Multiorganizational Perspective*, (pp. 121-137).

This chapter in Phillips and Hunt (1992) examines conceptual capacity,

defined as "a broad set of 'constructive' capacities that include the capacity for integration, abstraction, independent thought, and the use of broad and complex frames of reference" (p. 122), as an important attribute distinguishing successful from unsuccessful strategic leaders. The authors distinguish between leadership styles and conceptual capacities by specifying the latter as the degree of sophistication in an individual's organization of his or her experiences. They then present two theories (Jaques & Clement, 1991; Kegan, 1982) regarding individual differences in conceptual capacity. Both theories offer a hierarchical organization of increasingly complex conceptual capacities. Kegan emphasizes an increasing ability to apply an independent frame of reference or perspective to one's work experiences, while Jaques denotes an ability to think using abstract conceptualization, particularly the ability to think in terms of "parallel processing." The authors present preliminary research with officers at the U.S. Army War College and the Industrial College of the Armed Forces, in which measures based on these theories were applied. The officers demonstrated various levels of conceptual capacity; further, the measure of breadth of perspective, based on Kegan's work, was correlated .59 with Jaques' measure of work capacity. Implications for executive selection, training, and development are presented in the final sections of this chapter (2/2).

Lucas, K. W., Harris, P. & Stewart, S. R. (1988). *Training technology for the operational level of war*. Alexandria VA: U.S. Army Research Institute for the Behavioral and Social Sciences

The purpose of research described in this report was to (a) seek a relationship between executive skills as suggested by Jacobs and Jaques (1987) and the leadership requirements at the operational level of war; (b) develop performance objectives to use as training criteria; (c) examine the Joint Exercise Support System (JESS) as a measure of executive performance in the operational level of war; and (d) explore a systems approach to executive training in the Army. A review of Army training and doctrine literature suggested that successful performance in operational combat environments involved a future focus, reducing uncertainty, understanding the enemy's decision process, shaping the battlefield, and synchronization. These factors suggest three sets of executive skills: cognitive/conceptual (e.g., systems understanding, envisioning/anticipating, proactive thinking, scanning, problem formulation, reflective thought, personal stamina), technical (e.g., system and subsystem development, interdependencies, technological understanding) and interpersonal (e.g., organizational representation, understanding people, communications). The authors suggest that one principle of AirLand battle, synchronization, may act as a key operational performance measure. The JESS was observed as a training environment that incorporated synchronization in its requirements. However, the JESS was found to be insufficient as an executive/operational level development training system because it did not enhance

23

the cognitive skills underlying synchronization. In the final sections, the authors describe the requirements of a systems approach to executive training in the operational level of war (2/4).

Lucas, K. W., & Markessini, J. (1993). *Senior leadership in a changing world order: Requisite skills for U.S. Army one- and two-star assignments.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The purpose of this research was to examine the performance requirements, skills, and developmental experiences of one- and two-star generals. Hypotheses for this study were derived from Stratified Systems Theory (SST). Forty-two brigadier and twenty-six major generals were interviewed regarding their specific position requirements and tasks and the developmental needs of future senior leaders. Results from an analysis of the interview data indicated that one- and two-star positions in the army supported the premises of SST regarding successful work requirements. Specifically, two-star general officers had less well-defined reporting channels than officers at lower organizational levels, but more direct than those of three- and four-star generals. Likewise, the planning time frame was shorter for these officers than for more senior officers. The required knowledge and skills revealed in the interviews included cognitive skills (mental mapping, problem management, planning / envisioning), cognitive skills / personality traits (dealing with uncertainty / risk taking, appropriate exertion of control), communication / interpersonal (networking, consensus building, getting feedback, use of communication technology, effective interface with the external environment, and communication skills), and resource management (personnel and materiel). Interviewees cited training and development needs in the areas of military arts (e.g., training in the operational level of war), and cognitive, communication, and resource management skills. The authors argued that these findings support predictions from SST (3d/1,2,4).

Markessini, J. (1991). *Executive leadership in a changing world order: Requisite cognitive skills. The first literature review.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

A preliminary taxonomy of higher-order cognitive skills underlying executive work was developed in part from Stratified Systems Theory. This scheme contained four skills: mapping ability, problem management/solution, long-term abstract planning, and creative thinking. Markessini then conducted a review of the literature to identify theories, models, and taxonomies of cognitive processes, skills and abilities. The findings of this review with respect to the preliminary taxonomy is that substantial representation of mapping ability, problem management/solution, and

creative thinking was found in prior research. Long range planning was not widely cited; however, Markessini retained this task/skill because interviews with general officers indicated it to be a key requirement. The four skills were ordered in terms of progression of difficulty as mapping ability, problem management/solution, long-term planning, and creative thinking (1/2).

Markessini, J. (1991). *Executive leadership in a changing world order: Requisite cognitive skills. A taxonomy of cognitive capabilities for executives.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Markessini presents four generic tasks of executives: mapping ability, problem management, long term planning, and innovation/creative thinking. In subsequent sections of this report (a) each generic ability is defined, (b) its underlying process are specified further, (c) the higher order component cognitive skills associated with each generic task were specified, and (d) key individual difference that are linked to the generic tasks are identified. Also, each task is tied to executive performance. This report includes an analysis of interview data from 33 three- and 8 four-star generals that indicate substantial awareness of key cognitive and metacognitive skills as performance requirements (3d/2).

McIntyre, R. M., Jordan, P., Mergeb, C., Hamil, L., & Jacobs, T. O. (1993). *The construct validity of the CPA: Report on three investigations.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Three studies were conducted to assess the construct validity of the Career Path Appreciation (CPA) measure. In study 1, 87 graduate students completed the CPA and measures of creativity, achievement, and problem solving ability. The CPA was correlated with the measure of creativity and somewhat with problem solving ability, but not achievement. In study 2, 98 undergraduate students completed measures of career development decision making, preferred occupational complexity, learning styles/cognitive complexity, intelligence, and creativity, as well as the CPA. Correlational analyses indicated partial associations between the CPA and career decision making skill and intelligence. The CPA was also significantly associated with creativity, and learning styles/cognitive complexity. In the final study, 100 graduate and undergraduate students completed the CPA and measures of neuroticism, extraversion, openness, agreeableness, and conscientiousness, as well as the Meyers-Briggs Type Indicator and the Culture Fair Intelligence Test. Results show that the CPA was negatively correlated with neuroticism and positively correlated with openness, and the Meyers-Briggs dimensions of intuiting and perceiving. Taken together, these results show the CPA to be most strongly associated with measures of creativity. The authors conclude by specifying several

future research directions (3b/3).

Mumford, M. D. (1986). *Leadership in the organizational context: A conceptual approach and its application.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Mumford examines the literature on organizational leadership and notes the lack of a clear theoretical conception that can provide the framework for efforts in leader identification and development. He offers a definition of leadership as actions taken by the leader role incumbent to facilitate organizational effectiveness and adaptation. This suggests that organizational leadership involves high level discretionary problem solving. As such the author proposes a set of 12 generic problem solving skills that may be used to develop systems for the identification and development of leaders. The last section of the paper describes some potential leader identification and development strategies based on this approach (2/1,2,4).

Mumford. M. D., Baughman, W. A., Supinski, Costanza, D. P., & Threlfall, K. V. (1993). *Cognitive and metacognitive skill development: Alternative methods for predicting leadership potential.* Bethesda, MD: Management Research Institute.

The purpose of this study was (a) to develop computerized measures of problem solving skills hypothesized as necessary for leaders to solve novel and ill-defined organizational problems and (b) to propose a computer-assisted training program for the development of these skills. The targeted skills were problem construction, information encoding, category search and specification, category combination, and wisdom. Computer-based measures of these skills were administered to 127 undergraduates who also completed various problem solving exercises. Problem solving skills yielded multiple Rs in the range of .40 to .60. In a second sample of 161 undergraduate students, individuals who participated in a computer-assisted training program designed to assess and enhance these problem solving skills showed improvement in their performance on novel and ill-defined problems. The authors suggested that these findings point to a cost effective means of assessing and developing key leader problem solving skills (3a/4)

Mumford, M. D., Yarkin-Levin, K., Korotkin, A. L., Wallis, M. R., and Marshall-Mies, J. (1986). *Characteristics relevant to performance as an Army leader: Knowledge, skills, aptitudes, other characteristics and generic skills.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The authors reviewed the research literature on individual differences,

management, leadership, and social psychology as well as lists of army officer tasks to identify potential knowledge, skills, abilities, and other characteristics (KSAOs) associated with Army leadership performance. After definitions were developed for each KSAO, a panel of subject matter experts (i.e., retired army colonels) reviewed each one for its significant impact on leadership effectiveness, given the demands facing Army leaders. This effort, combined with other reviews, produced a taxonomy specifying required knowledge (e.g., military tactics, military strategy, weapons systems), cognitive abilities (inductive and deductive reasoning, decision making, information evaluation), physical ability, and other characteristics (judgement, self-confidence, initiative, adaptability). The authors also present a generic skills taxonomy that incorporates skills related to successful problem solving. These include monitoring and assessment of goal relevant cues, evaluation of discrepancy importance, resource allocation, problem definition, evaluation of problem solvability, selection of solution components, information encoding, coordination and comparison, generation of alternative solutions, solution implementation, and monitoring of solution implementation and outcomes. The authors conclude with a consideration of the applied implications of these taxonomies (2/2).

Mumford, M. D., Zaccaro, S. J., Harding, F. D., Fleishman, E. A., & Reiter-Palmon, R. (1993). *Cognitive and temperament predictors of executive ability: Principles for developing leadership capacity.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The premise of this work is that organizational leadership can be viewed as discretionary problem solving in ill-defined or novel domains. Accordingly, the authors offered a taxonomy of leadership behavior containing four superordinate dimensions (information search and structuring, information use in problem solving, managing personnel resources, and managing material resources) and 13 subordinate dimensions. Three validation studies of this taxonomy are reported. This taxonomy was used to specify 65 cognitive and temperament predictors of executive ability. These qualities were organized into 11 categories: general cognitive intelligence, creativity, crystallized cognitive skills, adaptability/ego resiliency, openness/curiosity, self-awareness, achievement, need for dominance, commitment to social systems, practical intelligence, and social intelligence. A model relating these skills to leader performance was also specified. Two studies were described that supported the validity of this taxonomy of leader characteristics. This report also describes a theory of leader development that emphasizes the changing nature of leader roles at successively higher organizational levels as well as changing skill requirements. Finally, background data and other measures of the specified cognitive and temperament leader characteristics were proposed (2/1,2,3,4).

Mumford, M. D., Zaccaro, S. J., Harding, F. D., & Fleishman, E. A. (under review). *The thinking leader: Developing leaders for a more complex world.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Measures of the cognitive and temperament predictors of executive leadership effectiveness that were specified by Mumford, Zaccaro, Harding, Fleishman, and Reiter-Palmon (1993) were administered to 1,807 officers ranging in rank from 2nd lieutenant to colonel. The measured predictors were knowledge and expertise, understanding of solution characteristics, problem solving skills, wisdom, practical intelligence, social intelligence, verbal reasoning skills, divergent thinking, crystallized cognitive ability, achievement motives, dominance, social commitment, adaptability, self-awareness, self-control, openness to experience, and the Meyers-Briggs Type Indicator. Criterion measures were rated performance on a series of open-ended problem solving measures, critical incident performance, manifest leader achievement, and attained rank. Officers also provided information on their career experiences that may have contributed to the development of leader skills. Regression analyses indicated that complex creative thinking skills, attention to solution characteristics, and wisdom were the strongest predictors of leader performance. Analyses comparing high performing junior and senior officers suggested that more concrete performance skills were developed early in the officer's career, while more complex skills emerged later on. The emergence of these skills was conditioned upon more basic abilities such as divergent thinking, responsibility, and achievement motivation as well as on the nature of assignments and other career events experienced by the officer. The implications for leader training, selection, and development were discussed (3b/2,3,4).

Phillips, R. L., & Hunt, J. G. (1992). *Strategic leadership: A multiorganizational-level perspective.* Westport, Ct.: Quorum Books.

This book presents contributions made by the chapter authors at a conference on strategic leadership sponsored by the U.S. Army Research Institute and the Army War College. The point of departure for the conference, and therefore for the book, was Jaques's Stratified Systems Theory. The 16 chapters are divided into 5 sections, titled "Setting the Stage", "Environment, Strategy and Structure", "Leadership Capabilities and Development", "Temporality and Dynamic Change Processes", and "Application and Concluding Commentary." The chapters are theoretical/conceptual in nature and, as a group, cover 8 cross-cutting themes. These are (a) organizations as hierarchies, (b) critical tasks, managerial work, (c) capacity, skills, competencies, behaviors, etc., (d) transformational, charismatic, visionary leadership, (e) organizational culture, climate, (f) leader succession: selection, development, training, (g) external environmental changes, and (h) temporal aspects (2/1,2,4).

Rigby, C. K., & Harris, P. (1987). *Program management offices: Structural modeling through applications of stratified systems theory.* Alexandria, VA: ARI technical report 736 (AD A181 940).

This was a study of the organizational structure of Program Management Offices (PMOs), their relationship with Major Subordinate Commands (MSCs) and the career development of individuals assigned as program managers. Data was provided from a review of prior studies on the military use of PMOs, a review of the organizational and management literature regarding the program management concept, and interviews with 61 program managers. The analysis of the data was based upon the principles of Stratified Systems Theory (SST). The interview data revealed that MSC commanders were experiencing greater complexity in their work as evidenced by more centralized decision making authority, increased information demands and reporting requirements, increased work loads, and static (instead of correspondingly increasing) resource levels. The relationships between operational and support units were ambiguous, with those units responsible for user satisfaction and deficiency-reporting the least clearly defined. In response to these observations, The authors specified the need for support staff to assist MSC commanders and PMOs. They also reported support for hypotheses derived from SST that MSC commander were operating at level V while the PMOs and supporting units operated at level IV. Other SST principles applied in this analysis included the requirement for support staff in operational spine components, alternate authority relationships for lateral support assignment, and the nature of level III PMO work., The authors used SST principles to construct two hypothetical PMO models, one a developmental-stage PMO and the other a production and fielding PMO. The application of these models was recommended on a case-by-case basis (3d/1).

Stamp, G. P. (1986). Some observations on the career paths of women. *Journal of Applied Behavioral Science, 22,* 385-396.

This study used Stratified Systems Theory to examine the influences of individual and organizational factors on the career paths of women. Key study variables were an individual's cognitive power and level of capability, as well as the organizational work requirements defined at different levels in terms of time span for completion. Stamp completed Career Path Appreciation interviews with 168 women in business organizations and the military. She discusses their responses to the CPA in terms 8 career path modes or curves reflecting the growth in an individual ability to handle increasing work time spans with assigned work responsibilities over a career span. The nature of individual capability and the likely institutional barriers are described for women operating in modes III to VIII. Stamp demonstrates that the influences of a women's capability and the nature of the barrier change across different organizational work strata (3d,1).

Stamp, G. P. (1988). *Longitudinal research into methods of assessing managerial potential.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Stamp presents evidence for the predictive validity of a procedure used to predict the rate of growth in an individual's capability to work at increasingly complex levels. This procedure, later refined as the Career Path Appreciation (CPA) is based on the definition of organizational work offered in Stratified Systems Theory (SST). SST also predicts rates of growth in an individual's capacity to engage in increasingly complex work. The measurement procedure involves an extended interview that includes a symbol sorting task as well as questions regarding the respondents' current work, history of their careers, and their future aspirations. This procedure was refined to include a task in which respondents select phrases that best reflect how they would approach their work as well as a more structured interview protocol. Predictions of potential were made for 274 men and women working at all levels in four multinational and international companies; the results from 182 respondents were examined in this study. After a period of 4 to 13 years, data were gathered from company records on the level of responsibility attained by an individual respondent. For a subsample of respondents, evaluations of potential were used to create growth rate curves. Analyses of the data showed a correlation between predicted rate of growth and attained level of responsibility of .79. The correlation for the sample completing the full CPA was .89. Further, the shape of growth curves was confirmed in 94% of the individuals for whom growth curves were predicted. These findings suggest that the CPA is a cost effective way of predicting potential capability to handle increasing work responsibility (3b/3).

Stamp, G. P. (1990). Notes on the development of Stratified Systems Theory and Career Path Appreciation. Appended to E. Jaques & G. Stamp, *Development of Stratified Systems Theory for possible implementation in the U.S. Army.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

In this paper, Stamp reviews the development and evolution of Stratified Systems Theory (SST) and its main concepts. Beginning from the earliest work by Jaques, Stamp covers the emergence of the time span concept and the definition of work. She also describes organizational levels corresponding to different time spans of work as well as the development of the capacity growth curves. Five studies are summarized that provide support for SST. Finally, Stamp reviews the development and tests of Career Path Appreciation as a means of assessing an individual's potential for growth in the capacity to carry greater work responsibility as defined by SST (1/1,3).

Stewart. S. R. (1992). *Leader development training needs assessment of U.S. Army battalion commanders.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The purpose of this study was to identify the training requirements of Army battalion commanders. Twenty-nine battalion commanders and their immediate supervisors were interviewed regarding the strengths and weaknesses of the battalion commanders, perceived differences between company and battalion command, mentoring, and perceived personal life changes that occurred since assuming battalion command. Both strengths and weaknesses were noted in five categories: technical and tactical competence, breadth of perspective, standards setting, people orientation, self-knowledge, delegation/risk taking. The most frequently cited difference between company and battalion command was the need for greater decentralization at the higher command level. Respondents also expressed great confusion regarding the nature of mentoring, with their responses being grouped into the categories of coaching, counseling, sponsoring, and mentoring. Key personal life changes that were mentioned included a mellowing effect and emotional maturation. Stewart concludes that leader training of battalion commanders should prepare them better for the greater complexity required in their jobs. Also, intellectual and emotional maturational processes should be the focus of leader development training (3d/4).

Stewart, S. R., & Angle, D. C. (1992). *Correlates of creative problem solving.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

This study (a) examined individual differences related to creative or unstructured problem solving, and (b) evaluated a training course designed to facilitate such problem solving. One hundred and nine college students were asked to construct as high as possible a free standing structure out of index cards. They were also asked to complete three types of verbal problems. One set of problems was unstructured, while the others were more structured. Subjects completed 12 measures of various individual differences proposed to be associated with successful creative problem solving. Students were drawn from two different classes. One class (n = 76) was process-oriented and geared toward improving creative problem solving skills. The other class (n = 33) adopted a more traditional, content-oriented approach. The results of multiple regression analyses indicated that four individual difference variables, mental rotation, preference for intuition as identified by the MBTI, preference for introversion as identified by the MBTI, and sensation seeking, accounted for 60% of the variance in the tower building task. Only the MBTI measure of preference for sensing was significantly associated with success on the verbal problems. Also, subjects in the experimental condition (i.e., students in the

process-oriented course) displayed a significantly greater improvement on the building task from the pretest to the posttest than the control subjects (i.e., students in the content-oriented course). Analyses also indicated that training increased participants' tolerance for ambiguity and their appreciation for unstructured problem solving. Training also influenced older students more than younger students. The authors conclude with several research issues for further consideration (3a/2,4).

Stewart. S. R. & Hicks, J. M. (1987). *Leader development training assessment of U.S. Army Training and Doctrine Command (TRADOC) brigadier commanders* (ARI Research Report 1454). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

This report summarized the findings from an evaluation of a leadership course offered by the Center for Creative Leadership to 25 TRADOC brigade commanders. Course participants completed a survey and an interview designed to assess the perceived value of the CCL course, how the course might be improved, and other pertinent development activities experienced by the participants. Means and standard deviations of the ratings indicated that the course was perceived as useful, particularly the elements on "Situational Leadership" and "Staff Feedback." Respondents were less likely to perceive the course as improving their abilities or providing them with significant self-insight. The most likely targets for a course such as this were reported to be battalion and brigade commanders. However, the CCL course as constituted at the time of the study was not viewed as appropriate or acceptable for wide-spread use in the Army. The authors recommended a needs assessment to developed future course content (3c,d/4).

Stewart, S. R., Kilcullen, R., & Hopkins, J. E. (1993). *Strategic Leader Development Inventory (SLDI)*. Paper presented at the annual meeting of the Military Testing Association, Williamsburg, VA.

This paper describes the development of the Strategic Leader Development Inventory (SLDI). The purpose of the SLDI is to assess the degree of an individual's skills and attributes that are associated with successful strategic leadership performance. One hundred and seventy-nine students at the U.S. Army War College (U.S.A.W.C.) indicated the behaviors characterizing the best and worst general officers and colonels they had known. Using prior empirical and theoretical research, these responses were reduced and grouped into categories of positive and negative attributes. Pilot versions of the SLDI were then developed to be self-administered as well as administered to an officer's subordinates, peers, and supervisors. These versions were then given to 434 officers at the U.S.A.W.C. and the Industrial College of the Armed Forces as well as to 1,283 subordinates, 887 peers, and 672 superiors. Responses to the SLDI were factor analyzed, revealing 5

positive attributes and four negative attributes. From these data the authors constructed a new version of the SLDI containing three broad types of factors, *conceptual skills and attributes* (conceptual flexibility, political sensibility, long term perspective, quick study/perceptive, complex understanding), *positive attributes* (empowering subordinates, strong work ethic, personal objectivity, team performance facilitation, personal toughness) and *negative attributes* (technical incompetence, explosive/abusive, arrogant/self-serving/unethical, rigid/micromanages, inaccessible). The paper concludes with a description of the computerized developmental feedback given to each respondent (3b/3).

Strait, M. J. (1991). *Executive development through asynchronous computer conferencing.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Strait completed a literature review to examine the feasibility of asynchronous computer conferencing (ACC) as support technology for Army executive development. Prior research on human development and organizational leadership did not facilitate an understanding of executive leadership and development, although the work of Jaques (1976; Jacobs & Jaques, 1987) was considered promising. Research on intellectual development in college students suggested that the effectiveness of ACC depended upon it being used as a work tool, rather than just as instructional technology. While prior research on ACC supported its value for geographically dispersed training units, little evidence or prior research existed for its utility as executive development technology. Strait concludes that for ACC to facilitate executive development, it must be integrated into a leader's real work environment where meaningful challenges and growth experiences are confronted (1/4).

Zsambok, C. E. (1993). *Advanced team decision making: A model and training implications.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The purpose of this study was to develop a training program to help officers institute effective strategic decision making in their teams. Based on prior theoretical work and observations of strategic decision making teams, Zsambok specified 10 key behaviors associated with effective team performance. The first four (defining roles and functions, engaging team members, compensating actions, and avoiding micromanagment), fostered a greater sense of team identity. Four additional behaviors fostered the team's conceptual level, or the intelligence of its problem solving and decision making actions. These were envisioning goals and plans, focusing on the time horizon and range of factors, detecting gaps and ambiguities, and achieving situation assessment by diverging and converging. The

final two behaviors, adjusting team performance action, and time management, referred to team regulatory mechanisms. These behaviors were integrated into the Advanced Team Decision Making (ATDM) model. Further, a booklet and summary card describing the ATDM model were developed to be used in leader training at the U.S. Army War College and at the Industrial College of the Armed Forces (ICAF). Zsambok conducted a formative evaluation of training using the ATDM model at ICAF. Thirty-eight teams completed a survey designed to assess this model. The results indicated that the ATDM model was perceived as reflecting behaviors associated with high team performance and that learning and practicing ATDM resulted in (a) greater understanding of effective team behaviors and (b) improvements in reported team performance quality (2/4).

Zsambok, C. E., Klein, G., Kyne, M. M., & Klinger, D. W. (1992). *Advanced team decision making: A developmental model.* Fairborn, OH: Klein Associates, Inc. Prepared for U. S. Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.

This is an instructional guide on advanced team strategic decision making to be used as part of the curriculum at the Industrial College of the Armed Forces. This booklet explains in detail the components of the Advanced Team Decision Making Model (see Zsambok, 1993). It also presents a case study of a decision making team at a senior service college. The purpose of the case study was to help trainees perceive and evaluate the application (or nonapplication) of the team behaviors and processes specified by the ATDM model (4/4).