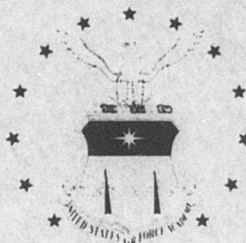


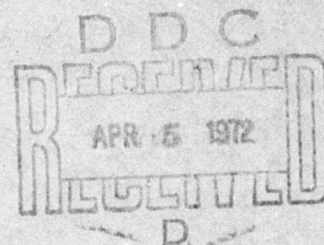
**DIFFERENTIAL EFFECTS OF DEMOCRATIC AND AUTHORITARIAN
LEADERSHIP STYLES ON GROUP PROBLEM SOLVING PROCESSES**

by

MAJOR JOSEPH A. CAMMALLERI
MAJOR HAL W. HENDRICK
MAJOR WAYNE C. PITTMAN, JR.
MAJOR HARRY D. BLOUT
MAJOR DIRK C. PRATHER



**RESEARCH REPORT 72-1
FEBRUARY 1972**



**UNITED STATES AIR FORCE ACADEMY
COLORADO 80840**

Reproduced by
**NATIONAL TECHNICAL
INFORMATION SERVICE**
Springfield, Va. 22151

AD 739895

24

R

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
Dean of Faculty USAF Academy, Colorado 80840		Unclassified	
		2b. GROUP	
3. REPORT TITLE			
DIFFERENTIAL EFFECTS ON DEMOCRATIC AND AUTHORITARIAN LEADERSHIP STYLES ON GROUP PROBLEM SOLVING PROCESSES			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Research Report			
5. AUTHOR(S) (First name, middle initial, last name)			
Major Joseph A. Cammalleri		Major Harry D. Blout	
Major Hal W. Hendrick		Major Dirk C. Prather	
Major Wayne C. Pittman, Jr.			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
February 1972	23	9	
8a. CONTRACT OR GRANT NO	9a. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO	RR 72-1		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
d.	none		
10. DISTRIBUTION STATEMENT			
Distribution of this document is unlimited			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Dean of Faculty USAF Academy, Colorado 80840	
13. ABSTRACT			
<p>These experimenters measured group goal accomplishments under four different types of leadership. Subjects (<u>Ss</u>) first made private individual estimates of the relative importance of 14 times in a survival situation. Subsequently, the same <u>Ss</u> were divided into 48 four or five man groups and asked for group consensual estimates. Group leaders had been contacted earlier, given the correct solution, and told to assume specific leadership roles: Style I (Authoritarian with high solution accuracy), Style II (Democratic with high solution accuracy), Style III (Authoritarian with an inaccurate solution), and Style IV (Democratic with an inaccurate solution). Groups with Style I leaders produced the most accurate estimates; Styles II and IV had intermediate and comparable accuracy; and Style III produced the lowest accuracy. These findings infer that authoritarian leadership is most effective under conditions of limited time, a structured task, good leader-member relations, and strong leader position power when the leader possesses high solution accuracy. Given the same conditions, however, if the leader does not possess (or is unsure of) an accurate solution, then the democratic leadership style is more effective because it more efficiently uses all of the group's resources.</p>			

Unclassified
Security Classification

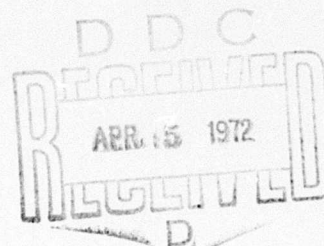
14.	KEY WORDS	LINK A		LINK B		LINK C	
		ROLE	WT	ROLE	WT	ROLE	WT
	Leadership Group Problem Solving Group Accuracy						

Unclassified
Security Classification

DIFFERENTIAL EFFECTS OF DEMOCRATIC AND AUTHORITARIAN
LEADERSHIP STYLES ON GROUP PROBLEM SOLVING PROCESSES

by

Major Joseph A. Cammalleri
Major Hal W. Hendrick
Major Wayne C. Pittman, Jr.
Major Harry D. Blout
Major Dirk C. Prather



UNITED STATES AIR FORCE ACADEMY
RESEARCH REPORT 72-1
FEBRUARY 1972



Additional copies of this document may be obtained by writing to the
Director of Faculty Administration, United States Air Force Academy,
Colorado 80840.

**Editorial Review by Captain John B. McTasney
Department of English**

This Research Report is presented as a competent treatment of the subject, worthy of publication. The United States Air Force Academy vouches for the quality of the research, without necessarily endorsing the opinions and conclusions of the authors.

TABLE OF CONTENTS

Abstract	iv
List of Figures and Tables	v
I. Introduction	1
Life Cycle Theory	1
Fiedler Contingency Model	2
II. Method	3
Subjects	3
Materials	3
Procedure	3
Individual Estimates	3
Group Estimates	6
Leaders' Pre-briefing	6
Leadership Styles	8
III. Results	9
Statistical Analyses	10
Summary of Statistical Results	10
Observers' Notations on Group Processes	12
IV. Discussion	12
V. List of References	16

ABSTRACT

These experimenters measured group goal accomplishments under four different types of leadership. Subjects (Ss) first made private individual estimates of the relative importance of 14 items in a survival situation. Subsequently, the same Ss were divided into 48 four or five-man groups and asked for group consensual estimates. Group leaders had been contacted earlier, given the correct solution, and told to assume specific leadership roles: Style I (Authoritarian with high solution accuracy), Style II (Democratic with high solution accuracy), Style III (Authoritarian with an inaccurate solution), and Style IV (Democratic with an inaccurate solution). Groups with Style I leaders produced the most accurate estimates; Styles II and IV had intermediate and comparable accuracy; and Style III produced the lowest accuracy. These findings infer that authoritarian leadership is most effective under conditions of limited time, a structured task, good leader-member relations, and strong leader position power when the leader possesses high solution accuracy. Given the same conditions, however, if the leader does not possess (or is unsure of) an accurate solution, then the democratic leadership style is more effective because it more efficiently uses all of the group's resources.

LIST OF FIGURES

Figure		Page
1	NASA Decision-Making Problem, Individual Form	4
2	NASA Decision-Making Problem, Group Summary Form	5
3	NASA Decision-Making Problem, Correct Solution	7

LIST OF TABLES

Table		Page
1	Summary of Means and Standard Deviations.	9
2	Means of Average Individual Error Scores.	11

INTRODUCTION

Effective leadership is desired and sought after by all formal organizations, particularly by those faced with chronic crisis-oriented situations such as the police and the military. Such concepts as the Life Cycle Theory and Fiedler's Contingency Model offer potential contributions for improvement of leadership techniques through identification of appropriate behaviors leading to successful leadership in specific environments and situations.

Leadership research has shifted from emphasis on personal traits to a conception of leadership as a function of group and environmental variables (Hollander & Julian, 1969). Current avocations such as Olmstead's (1967) theory on leader adaptability are useful. Olmstead contends that specific leadership style is less important than the leader's ability to analyze situational and environmental variables and adapt his behavior appropriately. Additionally, conceptual frameworks such as Hersey and Blanchard's (1969) Life Cycle Theory, and Fiedler's (1967) Contingency Model have provided heuristic and pragmatic experimental bases for contemporary leadership research. These theories are simultaneously dissimilar and complementary. Based on research, both deny that any one type of leadership style will be universally successful across all personal, group, and environmental variables. Both are experimentally oriented with emphasis on comparisons of effectiveness when democratic styles are contrasted with authoritarian styles. Thus, these theories continue the research initiated by Lewin, Lippit and White (1939), among others.

Life Cycle Theory

Dissimilarities evolve from differences in the basic assumptions of each theory. Life Cycle Theory contends that maturity of the group (psychological age) is the primary determinant of effective leadership style whether democratic (concern for people, relationships) or

authoritarian (concern for task accomplishment, production, autocracy) and that the style is synonymous with behavior rather than personality. Consequently, if the leader properly employs diagnostic skills, he may accurately estimate the group's maturity level and employ the appropriate leadership style regardless of his own personality tendencies. Based on a curvilinear progression through four quadrants of the authoritarian and democratic leadership dimensions, the resultant leadership style could then be authoritarian, democratic, or a combination of both.

Fiedler Contingency Model

On the other hand, Fiedler states that the leader's underlying personality structure and tendencies constitute dominant constraints for successful leadership. He advises leaders to seek primarily positions where compatibility of personality with organizational and environmental variables will maximize probability of leader success. Thus, Fiedler equates leadership style with personality (a predisposition to respond) and not with behavior, as do Hersey and Blanchard. This is an important difference with significant consequences for organizational leadership research.

Fiedler's notion of "favorability" of the environment is critical to his concept of leadership. Specifically, the environment can be ordered categorically according to the degree of favorability for the leader, with the appropriate leader style dependent upon the degree of favorability (Korman, 1971).

Favorability is a direct function of three contingency variables which are in decreasing order of importance: (a) leader-member relations (good or poor); (b) task structure (structured or unstructured); (c) leader position power (strong or weak). For example, based on empirical evidence, Fiedler would predict that the authoritarian leader would be most effective in a favorable environment (good leader-member relations, structured task, high position power) or in an unfavorable environment (poor leader-member relations, unstructured task, weak position power).

Concomitantly, democratic leadership style would be appropriate and most effective for moderately favorable environments (good leader-member relations, unstructured task, weak position power).

This experiment attempted to contrast effects of authoritarian and democratic leadership styles through manipulation of Fiedler's contingency variables under a limited time constraint. Specifically, the purpose of this experiment was to determine whether democratic or authoritarian leadership was more effective under the conditions of high or low leader task accuracy.

METHOD

Subjects

This experiment was conducted in two parts. Each study employed different samples of Ss. The initial study utilized 40 groups of four or five USAF Academy cadets, while the replication conducted one year later utilized 32 groups of four or five USAF Academy cadets. All Ss were male sophomores or juniors, between the ages of 19 and 23, enrolled in an advanced leadership course. These Ss were considered appropriate for this type of experiment because of their willingness to cooperate and to accept perceived legitimate authority in an academic environment.

Materials

Each subject received an individual copy of the NASA Decision-Making Problem (Figure 1), while group leaders were issued additionally a copy of the Group Summary form as illustrated in Figure 2.

Procedure

Individual estimates. In order to provide a realistic, structured task with a known solution, all Ss were initially administered individually the NASA Decision-Making Problem. The following instructions were read and distributed to the assembled Ss prior to the start of each trial:

<u>Item</u>	<u>Rank</u>
Box of matches	_____
Food concentrate	_____
Fifty feet of nylon rope	_____
Parachute silk	_____
Portable heating unit	_____
One case dehydrated Pet milk	_____
Two 100 lb. tanks of oxygen	_____
Stellar map (of the moon's constellation)	_____
Life raft	_____
Magnetic compass	_____
Five gallons of water	_____
Signal flares	_____
First Aid kit containing injection needles	_____
Solar-powered FM receiver-transmitter	_____

FIGURE 1
NASA DECISION-MAKING PROBLEM, INDIVIDUAL FORM

	Individual Predictions				Group Prediction
Member Name					
Box of matches					
Food Concentrate					
50 feet of nylon rope					
Parachute silk					
Portable heating unit					
One case dehydrated Pet Milk					
Two hundred-pound tanks of oxygen					
Stellar map (of the moon's constellation)					
Life raft					
Magnetic compass					
Five gallons of water					
Signal flares					
First Aid kit containing injection needles					
Solar powered radio					

Member _____
 Section _____
 Group _____

FIGURE 2
 NASA DECISION-MAKING PROBLEM, GROUP SUMMARY FORM

You are a member of a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties, however, your ship was forced to land at a spot some 200 miles from the rendezvous point. During reentry and landing, much of the equipment aboard was damaged and since survival depends on reaching the mother ship, the most critical items available must be chosen for the 200 mile trip. Below are listed the 14 items left intact and undamaged after landing. Your task is to rank order them in terms of their importance in allowing your crew to reach the rendezvous point. Place the number 1 by the most important item, the number 2 by the second most important item, and so on, through number 14, the least important. Work alone. Do not compare answers. You have 10 minutes to complete the task. All solutions will be compared for accuracy upon completion.

Group estimates. Upon expiration of the ten-minute limit for individual estimates, Ss were randomly assigned to groups of four or five. Random assignment was accomplished by arranging the cadets assigned to a class alphabetically and systematically assigning every fourth or fifth S to a particular group. Subsequently, leaders were publicly appointed, given group summary forms and told to assume responsibility for guiding the group to a consensual agreement on the rank order of importance of the survival items. A 30-minute time limit was imposed for completion of group activities.

Leaders' pre-briefing. Unknown to the other Ss, these leaders had been briefed prior to the trials, given the correct solution to memorize as shown in Figure 2, and instructed to adopt certain behavioral roles during the consensual process. The specification of these roles was crucial to the rationale of this experiment, for adherence to a specified behavioral role insured that the type of behavior desired from designated leaders would be elicited. Half the leaders were instructed to use an authoritarian leader style. Of these, one half were told to sway the group to the most accurate solution and the other half were instructed to sway the group to the least accurate solution possible. The other half

Rationale	Solution Rank	Survival Item
Little or no use on moon	<u>14</u>	Box of matches
Supply daily food required	<u>4</u>	Food concentrate
Useful in tying injured together, help in climbing	<u>6</u>	50 ft of nylon rope
Shelter against sun's rays	<u>8</u>	Parachute silk
Useful only if party landed on dark side	<u>12</u>	Portable heating unit
Food, mixed with water for drinking	<u>11</u>	One case dehd Pet milk
Fills respiration requirement	<u>1</u>	Two 100 lb tanks oxygen
One of principal means of finding directions	<u>3</u>	Stellar map
CO ₂ bottles for self-propulsion across chasms, etc.	<u>9</u>	Life raft
Probably no magnetized poles; thus, useless	<u>13</u>	Magnetic compass
Replenishes loss by sweating, etc.	<u>2</u>	Five gallons of water
Distress call when line of sight possible	<u>10</u>	Signal flares
Oral pills or injection medicine valuable	<u>7</u>	First Aid kit w/injection needles
Distress signal transmitter, possible communication with mother ship	<u>5</u>	Solar-powered radio

FIGURE 3
NASA DECISION-MAKING PROBLEM, CORRECT SOLUTION

of the leaders were briefed to utilize the democratic leader style. One half of these leaders were also told to try to sway their groups to the most accurate solution and one half were to attempt to achieve the least accurate solution.

Leadership styles. For the purposes of this study, the leadership styles were defined as follows: the authoritarian leader assumes and exercises complete control of the group in determining task structure, methodology and decision-making toward completion of the task. Authoritarian leader behavior emphasizes task completion above all other considerations. Conversely, the democratic leader shares responsibility for determining task structure, methodology, decision-making and task completion with the other members of the group. Consequently, democratic leader behavior is directed toward maintenance of harmonious interpersonal relationships as the primary means for task achievement.

In keeping with the above definitions, authoritarian leaders were instructed to maintain control of the group, argue absolutely for acceptance of their solutions, ignore any alternative solutions incompatible with their own, and to attempt to make all final decisions with complete autonomy. Democratic leaders were instructed to serve as facilitators with the primary aims of minimizing group conflict and enabling every group member's ideas to be aired and considered. Additionally, democratic leaders were advised to aid the group in achieving a consensual decision as opposed to exercising autonomous authority.

Prior to this study, all the subjects had received considerable instruction and experience in leadership techniques both in the classroom and through their military training. Because of these factors, the above definitions and behaviors were easily recognized and understood.

Thus, democratic and authoritarian leadership styles were combined with levels of high and low leader accuracy in order to measure differences in group problem solving accuracy. Average group absolute error scores were used for treatment comparisons, while grouped average error

scores of individual estimates were used to insure that the four treatment conditions were equivalent in terms of initial subject accuracy.

RESULTS

Table 1 depicts the summary of results for both studies. The pattern of results were similar for both the initial study and the replication.

TABLE 1
Summary of Means and Standard Deviations

Leader Style	Initial Study 1970			Replication 1971					
	N	Mean	SD	N	Mean	SD	Diff	df	t
STYLE I Authoritarian High Accuracy	12	10.42	9.04	8	7.25	8.21	3.17	18	0.76
STYLE II Democratic High Accuracy	12	20.67	6.40	8	21.38	5.53	.71	18	0.24
STYLE III Authoritarian Low Accuracy	12	33.33	7.15	8	38.50	6.77	5.17	18	1.64
STYLE IV Democratic Low Accuracy	12	26.08	7.04	8	27.00	7.03	.92	18	0.27

Error scores for authoritarian-led groups produced both the highest and lowest accuracy. This was directly related to the degree of accuracy employed by the leaders. Democratic-led groups produced intermediate accuracy levels. Democratic groups with high-accuracy leaders were only slightly different numerically from democratic groups led by leaders with low accuracy.

Statistical Analyses

A t test was used to analyze differences between means of the same leader styles for all four treatment conditions. No significant differences were found between the means for the two studies ($p < .05$).

In order to determine if the mean differences between different leader styles were significant, a one-way analysis of variance was conducted for each study. Significant differences in achievement between leader styles were found in both studies ($p < .001$, $F = 17.6$ and $F = 14.23$). Additionally, the Neuman-Kuels, a posteriori method for testing differences between means, was conducted. The performance of Leader Style I was found to be significantly better than the other three styles ($p < .01$). Additionally, Leader Styles I, II and IV were all found to be significantly more accurate than Leader Style III. It should be noted that Leader Styles II and IV, the high and low accuracy democratic-led groups, did not differ significantly from one another ($p > .05$). The results were the same for both studies.

The data indicate that authoritarian-led groups produced the highest and lowest accuracy as a direct consequence of the degree of accuracy employed by the leaders while democratic-led groups produced intermediate accuracy levels which were statistically equivalent despite the extreme differences in the accuracy levels of the leaders.

Summary of Statistical Results

The summary of results for the average individual error scores is depicted in Table 2. Individual error scores were averaged for each group. Group means were then averaged for each of the four leader styles.

For both studies, these means appear to differ only slightly numerically across the four treatment conditions.

TABLE 2
Means of Average Individual Error Scores

Leader Style	Initial Study 1970			Replication 1971		
	N	Mean	SD	N	Mean	SD
STYLE I Authoritarian High Accuracy	12	32.16	13.39	8	33.80	18.60
STYLE II Democratic High Accuracy	12	34.01	17.09	8	36.30	17.21
STYLE III Authoritarian Low Accuracy	12	35.90	15.94	8	32.70	19.69
STYLE IV Democratic Low Accuracy	12	31.84	13.64	8	35.90	17.09

In order to determine if these differences were significant, F tests were conducted. In both cases the overall F was found not significant at the .10 level ($F = 2.10$). It was concluded that the average individual error scores were equivalent for the four treatment conditions. Thus, the differences in consensual decision scores found between treatment

conditions in both the initial and replication studies could not be attributed to systematic differences in average individual error scores.

Observers' Notations on Group Processes

Each group was observed by an experimenter in order to evaluate group processes during exercises. The observers recorded their subjective descriptions of interpersonal activities indicating degree of conflict, cohesiveness and communication flow. Following completion of the consensual process, discussion periods were held to collect additional verbal data from leaders and group members. All results were content analyzed by the five experimenters to determine whether there were gross behavioral differences between the four treatment conditions. Typically, authoritarian-led groups were characterized by aggressive and hostile verbal acts between leader and group, while democratic-led groups were characterized by a lack of hostility and aggression and by considerable cooperation and harmony. Shouting and disagreements increased in intensity while flow of communication decreased between group members and leaders in authoritarian-led groups as the time limit was approached. This increase in verbal activity and concomitant decrease in communication flow was not observed in the democratic-led groups.

DISCUSSION

The results of this experiment support some of the empirical data surveyed earlier (Fiedler, 1967, Hersey and Blanchard, 1969, Olmstead, 1967). The activities of authoritarian-led groups were characterized by conflict and hostility, especially the high-accuracy groups which suffered from marked verbal clashes, aggression toward leaders, and a high number of disagreements despite the high accuracy of the leaders. The experimenters also noted that the total number of communication acts between leader and group members typically diminished during the consensual process. These phenomena support the findings of Lewin, Lippit and

White (1939). However, some of the hostility and aggression observed here could be attributed to the effects of normative behavior directed by Ss against peers who exercise authoritarian leadership in an academic environment.

The data support the predictions of the Contingency Model in that authoritarian leadership was most productive under conditions of good leader-member relations, a structured task and strong leader position power. In terms of goal achievement, which is synonymous with group accuracy for our purposes, the data indicate that highly accurate authoritarian leaders were most successful, authoritarian leaders with low accuracy were least successful, and democratic leaders produced moderate degrees of goal accomplishment which appear to be independent of leader accuracy.

Fiedler's contention that personality tendencies limit one's opportunities for successful leadership tended to be supported by observations of the experimenters and analysis of the verbal comments of the leaders. The leaders in many cases did play roles that were in dissonance with their personalities because of the random assignment of leaders to the four treatment conditions. Many were uncomfortable in their role playing. This was particularly true of the highly accurate authoritarians who perceived much group dissatisfaction with their leadership despite highly effective goal accomplishment. This could have implications for long-range effectiveness. For example, several leaders felt that prolonged role playing over a period of time might be deleterious to their psychological state of adjustment because of conflict between personal goals and the environmental requirements.

With regard to the variables of the Contingency Model, the public appointment of leaders assured them strong position power as evidenced by their ready acceptance as leaders by the group members. The specific nature of the task, the concreteness and familiarity with the problem stimuli and the explicitness of the instructions all aided in the structuring of the task. Additionally, initial good leader-member relations were

indicated by lack of hostility, intra-group harmony and willingness of the subjects to accept the problem and the leader's authority,

The deterioration of leader-member relations during the authoritarian consensual processes could indicate a possible weakness in the Contingency Model. One might question whether the contingency variables manipulated here are as static as the Model seems to imply. For example, during organizational activities, is it not possible for unstructured tasks to become structured, or for leader position power to increase or decrease? Also, the Model makes no provision for consideration of the group's maturity level or for the temporal variable which could prove consequential for short term effects on productivity and group harmony. Finally, the Contingency Model does not provide for any combination of authoritarian and democratic leader styles as does the Life Cycle Theory.

The successful accomplishments of the leaders despite random selection for role playing tend to support the notion of adaptability as espoused by the Life Cycle Theory. The ability to modify behavior as a consequence of environmental and situational requirements was demonstrated here. However, the long-term effects of personal conflict developed through dissonance of personality and organizational requirements remain in doubt. Perhaps combining Contingency Model concepts for long range effects with Life Cycle Theory applications for short-term effects could be fruitful. Further experimental study would seem desirable.

A possible weakness of this study was that both the collection and analysis of the subjective data were performed by the same individuals. This had the advantage of interpretation based upon observation but could potentially have resulted in some contamination related to personal bias.

Finally, the data tend to support Holloman and Hendrick (1970) who found that group consensual decisions were more accurate than the average of individuals on the same problem-solving task used in this study. It is interesting to note (see Tables 1 and 2) that authoritarian leaders with

low accuracy provide the sole exception to their findings. Comparisons of the Within Treatment means in both of the present studies with the corresponding average individual error scores indicate that these leaders may significantly distort the group average error score to a level comparable with the average of individual errors, thus negating the value of consensus in terms of productivity.

LIST OF REFERENCES

1. Fiedler, F. A theory of leadership effectiveness. New York: McGraw-Hill, 1967.
2. Hersey, P., & Blanchard, K. H. Management of organizational behavior. Englewood Cliffs, New Jersey: Prentice-Hall, 1969.
3. Hollander, E. P., & Julian, J. W. Contemporary trends in the analysis of leadership process. Psychological Bulletin, 1969, 71, 2, 387-397.
4. Holloman, C. R., Hendrick, H. W. Individual versus group effectiveness in solving factual and nonfactual problems. Proceedings of the 78th Annual Convention of the American Psychological Association, 1970.
5. Korman, A. K. Industrial and organizational psychology. Englewood Cliffs, New Jersey: Prentice-Hall, 1971.
6. Lambert, W. W., & Lambert, W. E. Social psychology. Englewood Cliffs, New Jersey: Prentice-Hall, 1964.
7. Lewin, K., Lippitt, R., & White, R. K. Leader behavior and member reactions in three 'social climates.' Journal of Social Psychology, 1939, 10, 271-279.
8. Olmstead, J. A. The skills of leadership. Military Review, March 1967, 62-70.
9. Yukl, G. A., & Wexley, K. N. Readings in organizational and industrial psychology. New York: Oxford University Press, 1971.