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In his contingency model of leadership effectiveness, Fiedler (1967) has identified two styles of leadership based on how the leader views his least preferred co-worker (LPC). Leadership style is defined as the underlying need structure of the individual which motivates his behavior in various leadership situations. The LPC instrument is usually composed of 17 bi-polar adjectives such as friendly-unfriendly, open-guarded, pleasant-unpleasant. The leader who views his LPC in favorable terms (e.g., friendly, open, pleasant) is considered a high LPC leader, while the leader who views his LPC in unfavorable terms (e.g., unfriendly, guarded, unpleasant) is considered a low LPC leader. The high LPC leader is characterized ". . . as a person who derives his major satisfaction from successful interpersonal relationships while the low LPC person . . . derives his major satisfaction from task performance./Fiedler, 1967, p. 45/."

LPC and Cognitive Complexity-Simplicity

Although the measurement of high and low LPC leadership styles has been frequently used for predicting performance, it has resisted meaningful interpretation. A number of studies (Bass, Fiedler, and Krueger, 1964; Burke, 1965; Fishbein, Landy, and Hatch, 1965; Golb and Fiedler, 1955; Steiner, 1959) have attempted, with little success, to interpret the LPC score by relating it to a variety of standard personality and attitude measures. Recent studies have indicated that the LPC might be a measure of cognitive process. Six of the ten variables that correlated significantly with the LPC score in the Bass et al. (1964) study were cognitive process

variables. It was suggested, therefore, that the main difference between a high and low LPC leader might be the way in which he categorized and structured his perceptions of others. A similar suggestion was made by Schroder, Driver, and Streufert (1967) in their discussion of human information processing. They indicated that the LPC score might be a simple measure of gross differences in how individuals perceived and judged information. Finally, Hill (1969) has reasoned that a high LPC leader might be more cognitively complex than a low LPC leader and thereby better able to differentiate between the interpersonal and task dimensions of his least preferred co-worker.

Although definitions of cognitive complexity differ (Bieri, 1955; Crockett, 1965), there is general agreement that individuals utilize a varying number of constructs to perceive and evaluate their environment. Individuals with low complexity, therefore, are characterized by categorical black-white perceptions as well as relatively few, but rigid rules of integration. On the other hand, individuals who are relatively complex perceive more differences in their environment, are more likely to view others in ambivalent terms, and are better able to assimilate contradictory cues. Hence, the implication is that a high LPC leader, since he distinguishes between his LPC as a worker and as a person and views him in positive as well as negative terms, is more complex than a low LPC leader who apparently does not make this distinction and views his LPC only in relatively negative terms.

At least two studies have attempted to relate the LPC score to measures of cognitive complexity. Weissenberg and Gruenfield (1966)

found a curvilinear relationship between the LPC and Witkins Embeded Figures Test (EFT). Mitchell (1969, 1970) found a positive correlation between LPC and an adaptation of Scott's (1962) measure of cognitive complexity.

In exploring the relationship between LPC and cognitive complexity, a major consideration is the instrument used to measure complexity-simplicity. Gardner and Schoen (1962) and Scott (1963) have stated that an individual could be cognitively complex in one domain and cognitively simple in another depending on his knowledge and experience in that domain. A first step, then, in testing for a possible relationship between LPC and cognitive complexity is to select a measure of cognitive complexity appropriate to the domain under investigation. A second major consideration pertains to the generality of the cognitive complexity measure. Vannoy (1965) administered to 113 males a battery of 20 different purported measures of cognitive complexity in the person-object domain and factor analyzed the results. Item intercorrelations and factor loadings indicated that cognitive complexity might consist of a number of distinct, possibly independent characteristics, not all of which were included in any single measurement instrument. Based on these results, Vannoy concluded that when conditions do not permit the use of multiple measures, "The Bieri measure, because it loaded in three different factors, appears to be a fairly good general measure /of cognitive complexity/, i.e., one which represents to a certain degree most of the aspects of cognitive complexity /Vannoy, 1964, p. 54/."

Preliminary evidence, therefore, has suggested a relationship between LPC and cognitive complexity-simplicity. Previous studies of cognitive

complexity, however, have indicated that cognitive complexity was not a general trait, that all purported measures of cognitive complexity did not measure the same characteristic, and that care should be taken in choosing a measure that was specific to the domain under investigation.

Purpose

The purpose of this study was to further explore the proposed relationship between LPC and cognitive complexity, and based on the literature to specifically test the following hypotheses:

1) The LPC score is positively related to measures of a person's cognitive complexity-simplicity in the domain of interpersonal relations. This hypothesis represents an attempt to replicate Mitchell's (1970) initial work and findings. In testing this hypothesis, we have expanded Mitchell's work by using an additional measure of cognitive complexity and a more diverse sample population.

2) The person with a middle-range LPC score is more cognitively complex in the domain of interpersonal relations than a person with a high or low LPC score. This hypothesis is based on the Bass et al. (1964) study which concluded that the middle-range LPC person was somewhat more critical and discriminating in his perception of others and perhaps more cognitively complex.

3) A person who responds with high scale variance when rating his LPC is more cognitively complex than a person with low scale variance. This hypothesis is an extension of the definition of cognitive complexity. A person who discriminates more highly between items in rating his LPC would appear to be more complex than a person who does not and therefore tends to rate his LPC relatively high or low on all items.

Samples

In testing for a relationship between LPC and cognitive complexity, five sample populations were employed.

Sample I was composed of 24 male, middle and upper-level managers attending a four-week executive development program. Their level of education ranged from those with a high school diploma through those with a doctorate degree. Their base salary was in the $26,000-$30,000 range, they averaged 18 years of managerial experience, and ranged in age from 31 to 50 years.

Sample II was composed of 30 male, civil service engineers and technical supervisors attending a four-day management development program. Approximately 95 per cent of the sample had a bachelor's degree and 25 per cent a master's degree. All were in supervisory positions and they ranged in age from 24 to 55 years.

Samples III and IV were composed of 30 and 49 male junior and senior undergraduate students enrolled in two business administration courses.

Sample V was composed of 44 male graduate students in business administration.

In summary, the samples were composed of male managers and executives from different types of organizations with varied educational backgrounds and experience and male undergraduate and graduate students enrolled in business administration courses.

Measurement Instruments

Three instruments were used for exploring the relationship between LPC and cognitive complexity.

LPC. The 17-item version of the Least Preferred Co-worker (Fiedler, 1967) measure was used to obtain an LPC score.

Cognitive Complexity. In an attempt to replicate Mitchell's (1970) study, his revision of Scott's (1962) measure of cognitive complexity was used. Scott's original measure included a list of 20 nations and the subject was asked to arrange these nations into categories which he thought belonged together and to indicate what he thought the nations had in common. For example, Great Britain and New Zealand might be grouped together as island nations. Mitchell (1970) adapted this measure to the domain of interpersonal relations by substituting a list of 20 groups in place of the nations. For example, subjects were asked to make as many categories as possible from such items as University swim team, NAACP, CIA, University Debate Club, etc.

The test can be scored using an H score, where $H = \log_2 n - \frac{1}{n} \Sigma n_i \log_2 n_i$, n is the total number of groups in the list, and n_i the number of groups placed in the same number of categories. The test can also be scored by summing the number of categories generated by the subject (the correlation in our study between the H score and the sum of categories score was .99). The more categories generated by the subject the more complex he is assumed to be. Mitchell's revision of Scott's measure of cognitive complexity-simplicity was administered to Samples I, II, III, and IV.

The second measure of cognitive complexity used in this study was Vannoy's adaptation of Bieri's Rep Test. Vannoy in his factor analysis of 22 measures of cognitive complexity found that Bieri's measure loaded on three of five main factors and suggested that it was the most adequate overall measure of complexity.

The measure used in this study was similar to Bieri's (Tripodi and Bieri, 1963) modification of Kelly's (1955) Rep test where constructs as well as persons were specified on a grid. Subjects were required to rate the persons specified (e.g., Father, Mother, Supervisor, etc.) in terms of the constructs (e.g., outgoing-shy; decisive-indecisive, etc.). Vannoy (1964) made two additional modifications in an attempt to reduce response sets. The constructs specified in the original Bieri measure were in the form of bipolar adjectives with the favorable adjective always appearing on the same side of the bipolar pair. In addition, the subject was required to rate each person on all constructs by using a plus or minus sign. Vannoy counterbalanced the desirable adjectives and substituted the letters "L" and "R" for the plus and minus marks to avoid any response set due to the use of a positive and negative sign. The Bieri measure, as modified by Vannoy, was given to Samples IV and V.

Procedure

The procedure in administrating the LPC and cognitive complexity measures was straightforward. All tests were administered in a classroom situation and the subjects were informed that the tests were part of a leadership study. The LPC test was administered first, followed by the two measures of cognitive complexity.

The only exception to this procedure occurred with group IV. The Bieri-Vannoy measure of cognitive complexity was administered to this sample approximately three weeks after the LPC and Scott-Mitchell measures. This resulted in a reduced sample size.

Results

Correlations between the LPC score and the Scott-Mitchell and Bieri-Vannoy measures of cognitive complexity for all five samples are presented in Table 1. Correlations between the LPC score and the Scott-Mitchell measure ranged from -.013 to .198 and were not statistically significant. Correlations between the LPC score and the Bieri-Vannoy measure ranged from .09 to .365; the latter correlation was significant at the .01 level.

Insert Table 1 About Here

The contingency model involves high and low LPC individuals, but has said nothing about those with a middle-range LPC score. In early studies, the high and low LPC designation depended on whether the score was above or below the median score. Later, the top and bottom thirds were designated high and low, excluding the middle third. Bass et al. (1964) have suggested that the middle LPC individual may in fact be more cognitively complex than either the high or low LPC individual because he tended to be more critical and discriminating in his perceptions of others.

Following this notion, correlations were computed with each sample divided into high, middle, and low LPC categories (Table 2).

Insert Table 2 About Here

Correlations between the LPC score and the Scott-Mitchell measure of cognitive complexity ranged from -.452 (significant at the .05 level) to .337 (nonsignificant) when divided into thirds. When the samples were

divided into high, middle, and low LPC categories, all of the correlations between the high LPC category and the Scott-Mitchell test were negative, suggesting that the higher the LPC score the lower the cognitive complexity of the individual.

Conceptually, one can reason that a person who rated his least preferred co-worker low[1] on all items was using one construct (task) to view his LPC and was not differentiating within this construct. An individual who rated his LPC high on all items apparently used interpersonal and task constructs to view his LPC, but did not differentiate much within these constructs. He tended to rate his least preferred co-worker high on all items.

It follows that a person who first used interpersonal and task constructs to view his LPC, and then showed variance or discrimination in his ratings within these constructs by rating his LPC high on some items, and middle or low on others, would tend to be more cognitively complex than a person who rated his least preferred co-worker high on all items.

Table 3 shows the correlations between high, middle, and low LPC scores and measures of cognitive complexity with the combined samples divided into high and low variance based on the LPC score. The only significant correlation between the LPC score and the Scott-Mitchell measure was obtained for high variance, low LPC. There were two significant

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[1] Fiedler's LPC measure consists of bipolar adjectives (i.e., pleasant-unpleasant, tense-relaxed, etc.) set against an 8-point scale. The least desirable adjectives are always at the low end of the scale, with the most desirable adjectives always at the high end.

correlations between the LPC score and the Bieri-Vannoy measure. The first, high variance, high LPC would support the hypothesis developed, but the second one, low variance, low LPC is the opposite of that predicted.

Insert Table 3 About Here

As a final step, correlations for each sample were tested for possible curvilinear relationships. An Eta test did not yield significant results.

In summary, the results did not support the hypothesis that the LPC score is related to measures of cognitive complexity-simplicity and we were unable to replicate Mitchell's study. The only significant correlation was between the Bieri-Vannoy measure of cognitive complexity and LPC. However, this was obtained in only one of the samples and we must conclude that it occurred under conditions that cannot be explained or replicated.

Summary and Conclusions

While the LPC score has remained uncorrelated with standard personality measures, there has been some evidence that the LPC score might, in part, be a measure of an individual's cognitive complexity. One hypothesis tested in this study was that an individual's LPC score is positively related to measures of his cognitive complexity in the domain of interpersonal relations. The results of correlational analysis failed to support this hypothesis.

The failure to support the hypothesized relationship between the LPC score and measures of cognitive complexity was disturbing for several reasons. First, there was a significant amount of theoretical support for

such a relationship; support provided by those who had studied the LPC score, as well as those who had conducted research in the area of cognitive complexity. Second, a previous empirical study (Mitchell, 1970) had reported finding a modest linear relationship between the LPC score and a measure of cognitive complexity--a finding that this study, using the same instruments, failed to replicate. Also, following the work of Vannoy (1965), who reported that different measures of cognitive complexity appeared to measure different aspects of the concepts, two separate measures of cognitive complexity were used to test for the relationship. Neither measure consistently produced significant correlations. Furthermore, Eta tests for curvilinear relationships failed to yield significant results. The subjects in the five sample populations used in this study were of varied backgrounds which ranged from executives in their fifties with 18 years or more of supervisory experience to undergraduate students in their twenties with limited supervisory experience. Age and experience, therefore, apparently had no effects on the LPC-cognitive complexity relationship. And finally, following the definition of cognitive complexity, which had indicated that individuals who showed greater variance in scoring the LPC items were more complex than those with less variance, the samples were separated into high and low variance categories. Again the findings were inconsistent, with significant correlations being found for both high and low variance individuals.

In view of these findings, as shown in Tables 1,2, and 3, we must conclude that there is no simple linear relationship between the LPC score and the Scott-Mitchell or Bieri-Vannoy measures of cognitive complexity.

Because of time limitations only two measures of cognitive complexity were used. The Scott-Mitchell measure was used in an attempt to replicate Mitchell's (1970) study and the Bieri-Vannoy measure was used because it appeared to be the best overall measure of cognitive complexity. Future research might explore the relationship between the LPC score and additional measures of cognitive complexity suggested by Vannoy's (1965) factor analysis of some 20 measures of cognitive complexity.

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TABLE 1

Correlations between LPC Score and the Scott-Mitchell and Bieri-Vannoy Measures of Cognitive Complexity

Sample	N	$\overline{X}$ LPC	$\overline{X}$ Scott	$\overline{X}$ Bieri	r LPC/Scott	r LPC/Bieri
I	24	67.7	14.2	--	-.013	--
II	30	64.0	10.0	--	.029	--
III	30	62.4	11.1	--	.092	--
IV	49	71.2	10.5	22.4^1	.198	$.09^1$
V	44	59.3	--	33	--	.365*

$^1N = 31$

$*p \leq .01$

Table 2

Correlations between LPC Score and the Scott-Mitchell
and Bieri-Vannoy Measures of Cognitive Complexity
Samples Divided into Thirds Based on LPC Score

	Upper 1/3 LPC			Middle 1/3 LPC			Lower 1/3 LPC		
Sample	N	$\bar{X}$ LPC	r LPC/Scott	N	$\bar{X}$ LPC	r LPC/Scott	N	$\bar{X}$ LPC	r LPC/Scott
I	8	86	-.375	8	68	-.077	8	48	.256
II	10	87	-.064	10	62	-.192	10	42	.467
III	10	78	-.121	10	61	.291	10	47	.244
IV	17	94	-.452*	16	69	.205	16	48	.377
V	--	--	--	--	--	--	--	--	--

	Upper 1/3 LPC			Middle 1/3 LPC			Lower 1/3 LPC		
Sample	N	$\bar{X}$ LPC	r LPC/Bieri	N	$\bar{X}$ LPC	r LPC/Bieri	N	$\bar{X}$ LPC	r LPC/Bieri
I	--	--	--	--	--	--	--	--	--
II	--	--	--	--	--	--	--	--	--
III	--	--	--	--	--	--	--	--	--
IV	12	92	.136	9	69	-.300	10	51	-.064
V	13	80	.367	15	60	.574**	15	38	.331

*p $\leq$ .05

**p $\leq$ .025

Table 2

Correlations between LPC Score and the Scott-Mitchell and Bieri-Vannoy Measures of Cognitive Complexity

Samples Divided into Thirds Based on LPC Score

	Upper 1/3 LPC			Middle 1/3 LPC			Lower 1/3 LPC		
Sample	N	X̄ LPC	r LPC/Scott	N	X̄ LPC	r LPC/Scott	N	X̄ LPC	r LPC/Scott
I	8	86	-.375	8	68	-.077	8	48	.256
II	10	87	-.064	10	62	-.192	10	42	.467
III	10	78	-.121	10	61	.291	10	47	.244
IV	17	94	-.452*	16	69	.205	16	48	.377
V	--	--	--	--	--	--	--	--	--

	Upper 1/3 LPC			Middle 1/3 LPC			Lower 1/3 LPC		
Sample	N	X̄ LPC	r LPC/Bieri	N	X̄ LPC	r LPC/Bieri	N	X̄ LPC	r LPC/Bieri
I	--	--	--	--	--	--	--	--	--
II	--	--	--	--	--	--	--	--	--
III	--	--	--	--	--	--	--	--	--
IV	12	92	.136	9	69	-.300	10	51	-.064
V	13	80	.367	15	60	.574**	15	38	.331

*$p \leq .05$

**$p \leq .025$

Table 3

Correlations between LPC Score and the Scott-Mitchell and Bieri-Vannoy Measures of Cognitive Complexity. Combined Samples Divided into Thirds Based on LPC and Divided at the Median Based on Variance on LPC

	Low Variance	High Variance
X upper 1/3 LPC	90.5	88.1
r LPC/Scott	-.356	-.036
N	51	15
X middle 1/3 LPC	62.9	65.9
r LPC/Scott	.094	.037
N	21	17
X lower 1/3 LPC	44.5	46.5
r LPC/Scott	-.087	.580*
N	15	19
X upper 1/3 LPC	84.7	87.8
r LPC/Bieri	.284	.551*
N	14	11
X middle 1/3 LPC	62.1	62.5
r LPC/Bieri	.389	.082
N	9	11
X lower 1/3 LPC	42.3	46.9
r LPC/Bieri	.596*	.021
N	16	11

*p $\leq$.01