

A Meta-Analytic Investigation of Fiedler's Contingency Model of Leadership Effectiveness

Michael J. Strube and Joseph E. Garcia
University of Utah

Meta-analytic techniques were applied to research testing the statistical validity of Fiedler's contingency model of leadership effectiveness. Past validations of the model, as well as criticisms of those validations, were reviewed and discussed. A meta-analytic solution was presented as a more satisfactory way to assess quantitatively the validation evidence. This approach was used to examine 145 hypothesis tests validating Fiedler's model, as well as the 33 results on which the model is based. The model was found to be extremely robust in predicting group performance. Through the use of meta-analytic techniques, it was found that the inclusion of studies not directly examined in earlier reviews served to increase the predictive power of the model. Based on the obtained results, several directions for future theory and research are discussed.

According to Fiedler's contingency model of leadership effectiveness (Fiedler, 1967), group performance is a function of the Leader $\times$ Situation interaction. The leader characteristic that is central to the model is leadership style or orientation as measured by the Least Preferred Co-Worker Scale (LPC; Fiedler, 1967). Leaders who score high on the scale (high-LPC leaders) are viewed as being relationship oriented, whereas leaders who score low on the scale (low-LPC leaders) are viewed as task oriented. Fiedler (1967, 1971b, 1978) has viewed control or influenceability over the group as the important situational characteristic. Furthermore, situational control is composed of three factors: group atmosphere, task structure, and leader position power (ordered in terms of importance). Dichotomizing each factor results in eight possible combinations or octants, ranging

from high through moderate to low control (see Table 1). The model, which was inductively derived, predicts that groups led by low-LPC leaders perform best in situations of both high and low control. High-LPC leaders have better performing groups in moderate control situations. Fiedler has maintained that low- and high-LPC leaders differ in their motives, which either facilitate or interfere with group performance, depending on the situation.¹

Fiedler's model represents the first concerted attempt to apply Lewin's (1951) precept that behavior is a function of the Person $\times$ Situation interaction to leadership research. His model has produced voluminous research in both the field and laboratory. However, the model has always been surrounded by controversy (e.g., Ashour, 1973; Fiedler, 1977; Graen, Alvares, Orris, & Martella, 1970; McMahon, 1972; Mitchell, Biglan, Oncken, & Fiedler, 1970; Schriesheim & Kerr, 1977a, 1977b; Shiflett, 1973). Of the various issues discussed in the literature, the question of the statistical validity of the model is the focus of this article. It is our aim to review briefly past validations of the model (Fiedler, 1971b, 1978), discuss problems associated with these validations

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Joseph E. Garcia is now at Everett Community College, Everett, Washington.

Requests for reprints should be sent to Michael J. Strube, Department of Psychology, University of Utah, Salt Lake City, Utah 84112.

¹ For a more extensive description of the contingency model, consult Fiedler (1971b), and Graen et al. (1970), and Rice (1978), as well as Fiedler's (1978) comprehensive review.

Table 1
Classification of Situational Control

Variable	Classification							
Group atmosphere	High				Low			
Task structure	High		Low		High		Low	
Position power	High	Low	High	Low	High	Low	High	Low
Octant	I	II	III	IV	V	VI	VII	VIII
Situational control	High ←————→ Low							

and some alternatives, and finally present and use a meta-analytic solution (e.g., see Cooper, 1979; Rosenthal, 1978, 1979).

In the first major review of the contingency model (Fiedler, 1971b), 25 studies that either tested or extended the model were examined. These studies, all conducted after 1964, measured leader LPC and group performance, and used various methodologies for operationalizing situational control. Nine studies with interacting groups were analyzed: five laboratory studies (Chemers & Skrzypek, 1972; Fiedler, 1966, 1971b; Mitchell, 1970; Shima, 1968) and four field studies (Fiedler, O'Brien, & Ilgen, 1969; Hill, 1969; Hunt, 1967; O'Brien, Fiedler, & Hewett, Note 1). Six additional studies (Anderson, 1966; Lawrence & Lorsch, 1967; Nealey & Blood, 1968; Nealey & Owen, 1970; O'Brien, 1969; Fiedler & Barron, Note 2), not directly classifiable into one of the eight situational-control octants, were also included. These "extension" studies were instead classified into the general categories of high, moderate, and low situational control by at least two of four judges (see Fiedler, 1971b). Separately treated were studies of co-acting (Bates, 1967; Hill, 1969; Hunt, 1967; McNamara, 1967) and training groups (Fiedler & Hutchins, cited in Fiedler, 1967; Seifert, 1969; Reilly, Note 3).

In Fiedler's review of direct tests of the model, binomial tests were used to assess the number of correlations in the predicted direction (Fiedler, 1967). Results indicated support for field ($p < .05$), laboratory ($p < .05$), and all studies combined ($p < .01$). The results for extension, co-acting, and training studies were analyzed individually and in a

qualitative manner, in which support for the model was claimed.

In his 1978 review, Fiedler added three laboratory studies (Rice & Chemers, 1973; Sashkin, 1972; Schneier, 1978) and one field study (Tumes, Note 4) that directly tested the model. As with the 1971 review, a binomial test of the pattern of correlations was computed, with results indicating support for all studies combined ($p < .01$). Three additional analyses were conducted. The percentage of correlations in the predicted direction was found to be 81%. The rank-order correlation between the median within-octant correlations from the original studies (Fiedler, 1967) and the corresponding median within-octant correlations from the validation studies indicated strong support for all studies combined ($p < .05$), field studies ($p < .05$), and the Chemers and Skrzypek study (1972; the first full test of the model) ($p < .01$). Finally, the squared median correlations were computed, resulting in an estimate of the proportion of variance accounted for in each octant. Results indicated strong support in octants I, IV, V, and VII; moderate support in Octant III; and scant support in Octants II, VI, and VII.

Analysis of the extension studies revealed a highly significant binomial test in support of the model, with 74% of the median correlations in the predicted direction. Also reviewed were a series of studies (Hardy, 1971, 1975; Hardy, Sack, & Harpine, 1973) that tested the model using an analysis of variance (ANOVA) approach. Since this approach deviated from the traditional method of computing LPC group performance correlations, a separate qualitative analysis was performed in which support for the model

was claimed. No studies with co-acting and training groups were treated in a quantitative manner, although one training study (Chemers, Rice, Sundstrom, & Butler, 1975) was examined extensively in a separate section.

In combining Fiedler's reviews (1971b, 1978), one finds that the validation evidence lends considerable support for the model. However, much debate has been raised concerning Fiedler's methods for demonstrating this support. Foremost among these criticisms has been the use of the binomial test as an adequate assessment of the validity of the model (Ashour, 1973; Graen et al., 1970; Mitchell et al., 1970). Central to these criticisms is the fact that the binomial test is sensitive only to the sign of correlations and not their magnitude. As Ashour (1973) has pointed out, small correlations can demonstrate an effect even if none of them is significant. In fact, only 6 of the 47 correlations between leader LPC and group performance (in the Fiedler, 1978, review) were significant. Moreover, the binomial test would not be sensitive to the case in which a relatively small number of highly significant results disconfirmed the hypothesis relative to many nonsignificant results in the predicted direction.

Several alternative approaches have been suggested but they too have been fraught with difficulties. For example, Ashour (1973), Graen et al. (1970), and Mitchell et al. (1970) have recommended testing the obtained octant correlations against the median correlations from the antecedent studies (Fiedler, 1967). However, Mitchell et al. are quick to point out that point predictions based on unstable results may be uninterpretable and that a test of the null hypothesis ($r = 0$) is equally advisable.

In a review by Graen et al. (1970), which found no support for the contingency model, an ANOVA approach was used, with correlations as data points. However, there are two problems with this technique as presented by Graen et al. (1970). First, for small n , the Fisher transformation is not entirely appropriate for Spearman correlations (cf. Kendall, 1975). Second, the ns on which the correlations are based are not taken into account, thus ignoring the significance level

of individual correlations (and assuming equally stable rs).

Another strategy, called the "batting average," was used in Rice's (1978) review, which found support for the model. The batting average of a relationship between two variables is equal to the percentage of significant results in the predicted direction. It can be used without regard to the types of test statistics used. This technique provides a rough estimate of the pattern of results, but because it ignores exact significance levels, it is somewhat imprecise.

Taken together, the above procedures represent only partial solutions to the problem of adequately testing the statistical validity of the contingency model. What is needed is a technique that accounts for exact significance levels, in addition to directionality and number of results. The solution advocated in the present article is meta-analysis (e.g., Rosenthal, 1978, 1979). These techniques, varying in complexity and sensitivity, allow the reviewer to determine the exact probability of a set of results given specific hypotheses. Moreover, the exact probabilities from various statistical procedures (e.g., rs , Fs) can be conveniently combined. In summary, meta-analytic techniques allow a quantitative assessment of how well a given set of results fit the predictions of a theory. The application of these techniques to the research testing the contingency model is exemplified by the following analysis.

Method

Tests of the Contingency Hypothesis²

A review of the literature was undertaken using *Psychological Abstracts*, *Social Science Citation Index*, and previous reviews as the main reference sources. The sample included the 33 tests that Fiedler (1967) used to derive the contingency model and 145 subsequent tests of the validity of that model.³ A test is defined as

² Results of the complete analysis may be obtained from the first author on request.

³ Three studies (Johnson & Ryan, 1976; Reavis & Derlega, 1976; Shaw & Blum, 1966) that purported to test the contingency model were not included in this analysis because leadership style was treated as a manipulated independent variable. This clearly violates Fiedler's (1967, 1978) assumption that leadership style is a relatively stable personality trait. In addition, a laboratory study by Vecchio (1977), which also claimed

any statistical analysis within any of the eight octants, or in the case of extension studies, within one of the three zones of situational control. Thus a study may contain more than one test.⁴

The hypothesis tested reflects the predicted within-octant (in the case of extension studies, *zones*) direction of the relationship between leader LPC and group performance based on Fiedler's (1967) formulation of the model. Specifically, the relationship between leader LPC and group performance is predicted to be positive in Octants IV, V, VI, and VII; and negative in Octants I, II, III, and VIII (see Table 1). It should be noted that the original studies contained no information for Octant VI, however, the theoretical formulation predicts a positive relationship. For the extension studies, the zones of high and low situational control are associated with negative relationships, whereas the moderate control zone is associated with a positive relationship.

Procedure

The meta-analytic techniques used in the present study have been described in detail elsewhere (e.g., see Rosenthal, 1978, 1979). The present review reports results based on Stouffer's formula (see Mosteller & Bush, 1954). In addition, tests of the mean p (Edgington, 1972b), the mean Z (Mosteller & Bush, 1954), Fisher's method (1948), and a method based on adding probabilities (Edgington, 1972a) were computed where appropriate to assess the stability of the results. Because there was high agreement among all methods and because Stouffer's technique was applicable to all results, only the latter is presented.

For each test of the hypothesis, the exact one-tailed probability was obtained (using tables of exact probabilities, such as Kendall, 1975, and Federighi, 1959) and transformed into a Z score. For results in the predicted direction, a positive Z and a $p < .50$ were recorded. A negative Z and a $p > .50$ were recorded for results in opposition to the hypothesis. The obtained Z s and p s for the studies used in the analysis can be found in Tables 2, 3, and 4.

The obtained Z s were combined using Stouffer's formula as follows:

$$Z_s = (\sum_{i=1}^n Z_i) / N^{1/2},$$

where

$$\sum_{i=1}^n Z_i$$

is the sum of individual Z scores and N is the number of tests combined. The resulting Z_s can be transformed back into a probability that represents the likelihood that the combined results occurred by chance. A number

of combinatory strategies (detailed in the Results section) were used to test various aspects of the model.

In addition, an algebraic manipulation of Stouffer's formula provides an estimate of the number of new, unpublished, or unrecovered hypothesis tests averaging null results that would be required to bring the overall probability to a desired level (e.g., $p = .05$). This value, known as the "fail-safe" $N(N_{fs})$ (Cooper, 1979), is useful in that it allows the assessment of the strength of the meta-analysis results in relation to the felt completeness of the review and in terms of the number of hypothesis tests already conducted. The formula takes the following form for overall $p = .05$ (i.e., just significant):

$$N_{fs} = (\sum_{i=1}^n Z_i / 1.645)^2 - N.$$

This number was computed along with Z_s for all results.

Results

Original Studies

Several classifications of the data were made so that a number of temporal and categorical representations of the model could be examined. Of initial interest are the results of the meta-analysis computed on the original studies used by Fiedler (1967) to derive the model. Results indicated overall support for Fiedler's derivation ($N = 33$ results, $p = 6.44 \times 10^{-12}$, $N_{fs} = 526$), with all but Octants III and VII receiving support (all p s $< .05$ and $N_{fs} \geq 10$). Octant VI contained no studies.

Fiedler's 1978 Review: Octant-Bound Studies

The next classification was based on Fiedler's (1978) review of the validation evidence for the contingency model. This classification was further subdivided into hypothesis tests resulting from field and laboratory experiments. Overall, support was found when

⁴ Strictly speaking, a meta-analysis assumes independence of the results to be combined. However, this assumption may be violated in the case where there are multiple tests from a single study or multiple tests performed by one research group (Cooper, 1979; Strube, 1981). We recognize the possibility of this bias but make the same assumption of independence of tests made by previous reviewers. In addition, our dismissal of these sources of nonindependence is based on the relative absences of deception and minimal experimenter intervention characteristic of the studies reported in this article (cf. Rosenthal, 1969).

to test the model, was not included in the present review. Vecchio's method of assigning subjects to groups was not consistent with Fiedler's (1978) concept of group atmosphere. In Vecchio's study, all leaders were required to have at least one "unfavorably ranked classmate" in the three-member work group.

Table 2
Original Studies Used by Fiedler to Derive the Contingency Model

Reference	Octant													
	I		II		III		IV		V		VII		VIII	
	Z	p	Z	p	Z	p	Z	p	Z	p	Z	p	Z	p
Anderson & Fiedler (1964)					.10	.460					.20	.421		
					-.16	.562					.13	.448		
Cleven & Fielder (1956)	2.00	.0228												
Fiedler (1954)			2.81	.00248										
			2.45	.00710										
			1.99	.0233										
Fiedler (1955)	1.94	.0265							.74	.231				
	.88	.188							.80	.212				
Fiedler, Bass, & Fiedler (Note 5)							1.06	.145					.48	.317
Fiedler, London, & Nemo (Note 6)							1.65	.0491					1.92	.0276
Fiedler, Meuwese, & Oonk (1961)							1.83	.0330					1.92	.0276
													1.29	.0979
													.53	.297
Godfrey, Fiedler, & Hall (1959)	2.06	.0197					.58	.282	.63	.263			1.79	.0370
Havron, Lybrand, Cohen, Kassebaum, & McGrath (Note 7)	1.81	.0351												
Hutchins & Fiedler (1960)	.96	.169							1.42	.0775				
Mental Health Leadership Study (Fiedler, 1967)							.96	.169					1.87	.0305
Meuwese & Fiedler (Note 8)					.93	.176	.47	.321			.42	.335	.46	.325

Note. Results for multiple dependent measures in the same octant are averaged. Octant VI is not reported because data were not provided in Fiedler's (1967) original formulation of the contingency model. Data are adapted from Table 9-1 in *A Theory of Leader Effectiveness* by F. E. Fiedler. New York: McGraw-Hill, 1967. Copyright 1967 by McGraw-Hill. Reprinted by permission.

Table 3
Octant-Bound Validation, Training, and Co-Acting Studies

Reference	Octant					
	I		II		III	
	Z	p	Z	p	Z	p
Bates (1967) ^{a,b}	1.63	.0514				
Chemers, Rice, Sundstrom, & Butler (1975) ^c						
Chemers & Skrzypek (1972)	.39	.350	.23	.408	-.05	.521
Csoka (1975) ^{b,d}	2.63	.00427			3.50	2.33×10^{-4}
Csoka & Fiedler (1972) ^{b,d}	1.53	.0630			2.96	.0015
	1.74	.0409			2.24	.0125
	3.20	6.87×10^{-4}			2.63	.0043
Fiedler (1966)	1.56	.0588	-.81	.791	.66	.255
Fiedler (1971b)			-1.02	.846		
Fiedler & Hutchins (in Fiedler, 1967) ^{b,c}	-1.75	.906				
Fiedler, O'Brien, & Ilgen (1969)			.69	.246		
Graen, Orris, & Alvares (1971a) ^d	-.89	.813	.76	.223	-.87	.808
	.29	.387	-.41	.659	-.02	.510
Hardy (1971) ^d	2.55	.00534	-1.59	.944	2.72	.00331
Hardy (1975) ^d						
Hardy, Sack, & Harpine (1973) ^d			-1.60	.945		
Hill (1969) ^{a,b}	.48	.314			.67	.250
Hill (1969) ^b			.24	.405	.68	.247
Hovey (1974) ^d						
Hunt (1967) ^{a,b}	.91	.181				
	.19	.425				
Hunt (1967) ^b	1.48	.0701			-1.17	.879
	1.39	.0824			1.50	.0670
McNamara (1967) ^{a,b}	1.48	.0694				
Mitchell (1970)			-.75	.773		
O'Brien, Fiedler, & Hewett (Note 1) ^b			1.01	.155		
Reilly (Note 3) ^c					-2.46	.99310
Rice & Chemers (1973)						
Sashkin (1972)					.84	.201
Sashkin, Taylor, & Tripathi (1974) ^{b,d}					-.31	.622
Schneider (1978)			3.86	5.67×10^{-5}		
Seifert (1969) ^{b,c}	-2.10	.9821				
	-1.61	.9463			-1.61	.9463
Shiflett & Nealey (1972) ^d					-.58	.719
Shima (1968)			.96	.168		
Tumes (Note 4)	2.84	.00226				

Note. Results for multiple dependent measures in the same octant are averaged.

^a Co-acting groups. ^b Field study. ^c Training groups. ^d Not in Fiedler (1978).

field and laboratory studies were combined ($N = 47$, $p = 6.49 \times 10^{-7}$, $N_{fs} = 360$). However, only Octants I ($p = 3.02 \times 10^{-4}$) and

IV ($p = 1.39 \times 10^{-5}$) were supported at an acceptable level of significance. When analyzed separately, both field ($N = 21$, $p =$

Table 3 (continued)

Octant									
IV		V		VI		VII		VIII	
Z	p	Z	p	Z	p	Z	p	Z	p
		1.83	.0330						
				4.42	4.9×10^{-6}			3.20	6.87×10^{-4}
.26	.396	.26	.396	.07	.473	.04	.483	.23	.408
		3.11	9.35×10^{-4}					4.53	2.95×10^{-6}
		3.23	6.19×10^{-4}					3.07	.00107
		2.43	.00755					3.37	3.76×10^{-4}
		.78	.218					1.69	.0455
.155	.438	.14	.444	.155	.438	-.01	.504	-.25	.599
1.58	.0567								
		.62	.268						
0	.500			1.91	.0282			1.67	.0471
.60	.273	.53	.297	-.84	.800	.93	.176	-.70	.757
-.17	.567	-1.28	.900	-1.04	.851	1.10	.136	-1.07	.858
2.05	.0204								
		3.65	1.32×10^{-4}	3.65	1.32×10^{-4}	2.07	.0193	1.28	.101
2.46	.00686			2.83	.00235			1.68	.0461
		1.28	.0996			2.33	.00991		
				-.61	.730	1.58	.0566		
-.87	.807							1.49	.0682
		1.50	.0670						
		1.52	.0643						
		.62	.269			.41	.342		
						-.41	.658		
		.96	.168						
1.55	.0606								
1.26	.104			-1.10	.864			.27	.393
				.76	.224			1.04	.149
						.55	.291		
				-.67	.749				
.18	.429								
3.20	6.87×10^{-4}								
3.84	6.15×10^{-5}								

6.87×10^{-4} , $N_{fs} = 58$) and laboratory studies ($N = 26$, $p = .00159$, $N_{fs} = 58$) confirmed the model's predictions. However, only the

results in Octant IV ($p = .00126$) were supported in the laboratory studies, whereas both Octants I ($p = 4.38 \times 10^{-4}$) and IV

Table 4
Extension Studies

Reference	Situational control					
	High		Moderate		Low	
	Z	p	Z	p	Z	p
Anderson (1966)	1.24	.108	-.51	.695	-.26	.604
Fiedler & Barron (Note 2)	-.48	.686				
	1.14	.128	1.07	.142	.95	.171
	1.12	.132	-.175	.569	1.35	.0885
Geyer & Julian (1973)	-.42	.663	-.185	.573	-.045	.518
			.10	.460	1.89	.0294
			1.33	.0917	2.84	.00224
Hardy & Bohren (1975)						
Lawrence & Lorsch (1967) ^a	.95	.171	1.36	.0870		
	.14	.445				
	.22	.414				
Nealey & Blood (1968) ^a	.95	.171	2.40	.00820		
Nealey & Owen (1970) ^a	2.58	.00494				
O'Brien (1969)	.29	.386	3.68	1.17×10^{-4}	.70	.242

Note. Results for multiple dependent measures in the same zone are averaged.
^a Field study.

($p = .00164$) corroborated the model in the field studies. Table 5 presents the within-octant results for the above classifications.

Additions to Fiedler's 1978 Review

A number of direct tests were not included in Fiedler's (1978) quantitative review for

a variety of reasons (e.g., poor methodology, varying statistical procedure, oversight). An analysis of these results found overall support for the model ($N = 50$, $p = 1.28 \times 10^{-18}$, $N_{fs} = 1,358$). Analyses within each octant indicated support (all $ps < .05$) in all but Octant III. When these results are added to those from Fiedler's (1978) review, the

Table 5
Meta-Analysis of the Studies Included in Fiedler's (1978) Review

	Octant								
Statistic	I	II	III	IV	V	VI	VII	VIII	Combined
Field studies									
<i>N</i>	3	3	3	3	1	3	3	2	21
<i>Z_s</i>	3.30	1.12	.58	2.94	.62	.12	.91	1.37	3.20
<i>p</i>	4.83×10^{-4}	.131	.281	.00164	.268	.452	.181	.0853	6.87×10^{-4}
<i>N_{fs}</i>	9	0	0	7	0	0	0	0	58
Laboratory studies									
<i>N</i>	2	6	3	5	2	3	2	3	26
<i>Z_s</i>	1.38	1.01	.84	3.02	.28	.57	.07	.59	2.95
<i>p</i>	.0838	.156	.2005	.00126	.390	.284	.472	.278	.00159
<i>N_{fs}</i>	0	0	0	12	0	0	0	0	58
Combined									
<i>N</i>	5	9	6	8	3	6	5	5	47
<i>Z_s</i>	3.43	1.47	1.00	4.19	.59	.48	.72	1.32	4.84
<i>p</i>	3.02×10^{-4}	.0708	.159	1.39×10^{-5}	.278	.316	.236	.0934	6.49×10^{-7}
<i>N_{fs}</i>	17	0	0	44	0	0	0	0	360

statistical support for the model is increased ($N = 97$, $p = 2.72 \times 10^{-22}$, $N_{fs} = 3,234$). All but Octant II received strong support ($ps < .05$). Table 6 contains these additional studies and the combined results for all octant-bound validation studies.

Training and Co-Acting Studies

Several investigations have examined the contingency model in relation to training and co-acting groups. Although these studies have not examined Octants II and IV, the obtained overall results for the remaining octants support the model's predictions ($N = 21$, $p = .00256$, $N_{fs} = 40$). Individual support was found in Octants V, VI, VII, and VIII (all $ps < .01$). Table 7 contains the relevant within-octant results. When these tests are combined with the previous findings, the results again indicate strong support for the model ($N = 118$, $p = 1.71 \times 10^{-23}$, $N_{fs} = 4,173$), with all but Octant II supported (all $ps < .005$; see Table 8). This represents the combined results for all octant-bound hypothesis tests (both validation and training and co-acting studies).

Extension Studies

A number of studies testing the model were not classified into octants but were instead classified into one of three categories along the situational control dimension (low, moderate, high). Combined, these hypothesis tests corroborate the other validation evidence ($N = 27$, $p = 1.58 \times 10^{-5}$, $N_{fs} = 190$). This was also true within the three other categories of low ($p = .00256$), moderate ($p = .00122$), and high ($p = .00990$) situational control (see Table 9).

Finally, when all the evidence is considered, the results become even more striking. All hypothesis tests combined results in a $p = 2.99 \times 10^{-28}$ ($Z = 10.96$), with $N_{fs} = 6,292$ ($N = 145$ total hypothesis tests).

Discussion

Summary of Results and Comparison to Earlier Reviews

The results of the present investigation are impressive when compared with the more selective reviews of past authors. For example, Fiedler (1971b, 1978) presented rel-

Table 6
Meta-Analysis of Additional Studies Not Included by Fiedler (1978)

Studies	Octant								
	I	II	III	IV	V	VI	VII	VIII	Combined
Field and laboratory									
N	7	4	9	6	7	4	4	9	50
Z_s	4.18	-1.42	4.09	1.74	4.70	2.30	2.32	5.11	8.73
p	1.46×10^{-5}	.9222	2.16×10^{-5}	.0409	1.30×10^{-6}	.0107	.0102	1.61×10^{-7}	1.28×10^{-18}
N_{fs}	38	0	47	1	50	4	4	78	1,358
Additional studies & Fiedler (1978)									
N	12	13	15	14	10	10	9	14	97
Z_s	5.40	.44	3.80	4.30	4.26	1.83	2.09	4.89	9.64
p	3.33×10^{-8}	.330	7.23×10^{-5}	8.50×10^{-6}	1.02×10^{-5}	.0336	.0183	5.04×10^{-7}	2.72×10^{-22}
N_{fs}	117	0	65	82	57	2	6	78	3,234

atively weak support for the model based on various subsets of studies. Further, there have been no tests of the model's validity at the level of specific octants. The present investigation circumvented both problems by including all recoverable tests of the model and examining the pattern of results within each octant. The model as a whole was overwhelmingly supported. As indicated by the obtained N_{fs} (6,292), it would take a substantial number of null results (mean $p = .5$) to bring the overall probability to the "just significant" level (i.e., $p = .05$), let alone to disconfirm the model. Given that it took 13 years to generate the present validation evidence consisting of 145 hypothesis tests, it is unlikely that the model will be disconfirmed in the near future. Equally important, all but Octant II was consistent with predictions. The failure to find support in Octant II may be due to the difficulty in producing these conditions in an experimental setting. It seems unlikely that high group atmosphere, high task structure, but low position power occur in stable groups, but they may be characteristic of groups with emergent leaders.⁵

The present investigation also allowed combination of a number of studies, either treated separately or ignored by Fiedler (1978) (e.g., Graen et al., 1970; Hardy, 1971, 1975; Hardy & Bohren, 1975; Hardy et al., 1973). Taken together, these studies also confirmed the model overall, although the within-octant pattern differed. For example, when the probabilities are examined, support is found ($p < .05$) in Octants I and IV for studies reviewed by Fiedler (1978), in all but Octant II for additional studies, and in Octants V through VIII for training and co-acting studies. However, caution should be exercised in interpreting these patterns. Octants differ not only in the number of studies conducted but also in the size of the N_{fs} (an indication of the stability of the results). Indeed, the number of studies within octants for the various categories of analysis (i.e., Fiedler's, 1978, review, additional studies, training, and co-acting studies) range from zero to nine.

Several additional concerns should be mentioned. Although the present study demonstrated statistical validity, previous meth-

odological criticisms of individual studies (e.g., Fiedler, 1971a; Graen, Orris, & Alvares, 1971a, 1971b) are still justified. It is not our purpose to duplicate or add to past efforts at clarifying the results of individual studies. It is, however, of major importance to identify systematic sources of bias in groups of studies. For example, Fiedler's (1971b) reported reclassification of studies into octants by independent judges represents a potential threat to this statistical validation. Additional meta-analyses were conducted to test the possibility that this reclassification biased the results toward confirmation of the theory. When the 31 hypothesis tests, reclassified by Fiedler's judges, are removed from the octant-bound sample, the Z_s increases from 9.92 to 10.65, indicating that the reclassified subsample shows less support relative to the unclassified sample. In fact, the Z_s for the reclassified subsample alone did not achieve significance ($Z_s = 1.52$). Similarly, the reclassified extension studies did not achieve significance ($Z_s = 1.33$).

A meta-analysis can also be invalidated by lack of independence between hypothesis tests, and this can arise in a variety of ways (Cooper, 1979). At least three potential sources of nonindependence are present in the contingency model literature. First, treating multiple dependent variables from the same subjects as separate hypothesis tests produces nonindependence. This source of bias existed in the validation evidence presented by Fiedler (1971b, 1978) and Graen et al. (1970) but was avoided in the present review by the procedure of averaging results from multiple dependent measures from the same subjects.⁶ Second, bias can exist when a number of studies are conducted by the same research group. This source of bias can be quite difficult to detect, since it can occur in several ways (e.g., idiosyncratic methodology, regional subject

⁵ We are indebted to Charles Turner for suggesting this possibility.

⁶ Exceptions occurred when subjects performed both structured and unstructured tasks (e.g., Chemers & Skrzypek, 1972; Graen et al., 1971a). Although these actually violate the assumption of independence, it is unlikely that there were systematic carry-over effects, since the order of tasks was counterbalanced.

Table 7
Meta-Analysis of Studies Examining Training and Co-Acting Groups

Training & co- acting studies	Octant								Combined
	I	II	III	IV	V	VI	VII	VIII	
<i>N</i>	8	0	3	0	6	2	1	1	21
<i>Z_s</i>	-.27	—	-1.96	—	3.15	2.65	2.33	3.20	2.80
<i>p</i>	.606	—	.975	—	8.16×10^{-4}	.00402	.00990	6.87×10^{-4}	.00256
<i>N_{fs}</i>	0	—	0	—	16	3	1	3	40

samples, etc). To test the possibility that the model is supported predominantly by studies conducted by Fiedler and his associates,⁷ a *t* test was computed on the mean *Z* score for results obtained by Fiedler et al. ($M = 1.041$) versus results obtained by independent researchers ($M = .729$). The obtained test, $t(143) = 1.43$, $p < .08$, indicates that studies conducted by researchers affiliated with Fiedler were somewhat, though not significantly, more supportive of the model than those conducted by independent researchers. Although this marginal trend could still be interpreted as evidence for researcher bias, it is also true that when considered alone, both groups of researchers support the model ($p < .001$). Finally, a bias can exist at the level of the review, where selection of studies may reflect some systematic and/or subjective criteria. Also, traditional literature reviews rely heavily on subjective conclusions. By contrast, this review included a large number of studies uncovered by an information retrieval search system and drew conclusions based on the sophisticated statistical procedures of meta-analysis.

Implications and New Directions

Although the present review points out the strengths of the model, the statistical tech-

niques used in this study also identified several weaknesses in the model that are in need of attention. Although the contingency model has been tested over a relatively wide range of persons and settings, several gaps do exist. Most obvious are the relatively small number of studies conducted with training and co-acting groups. These groups are represented in many natural settings, such as assertiveness-training labs, classrooms, production crews with little interaction among crew members, sales occupations, and such noninteractive sports as track and field, swimming, and gymnastics. For example, in-depth studies of training groups have several implications. Training groups represent situations in which leader-member relations, task structure, and position power can be altered systematically over time. This allows for the study of developmental changes in situational control and subsequent effects on the leader-group performance relationship. In addition, the contingency model could provide a framework for gaining an understanding of the process by which new group members are socialized by leaders through training in the norms and values of the or-

⁷ Associates of Fiedler were defined as co-authors, students, and research associates.

Table 8
Meta-Analysis of All Octant-Bound Studies

Statistic	Octant								Combined
	I	II	III	IV	V	VI	VII	VIII	
<i>N</i>	20	13	18	14	16	12	10	15	118
<i>Z_s</i>	4.01	.44	2.67	4.30	5.30	2.75	2.72	5.56	9.92
<i>p</i>	3.04×10^{-5}	.330	.0038	8.50×10^{-6}	5.79×10^{-8}	.00298	.00326	1.35×10^{-8}	1.71×10^{-23}
<i>N_{fs}</i>	99	0	29	82	150	22	17	156	4,173

Table 9
Meta-Analysis of Extension Studies

Statistic	Situational control zone			
	High	Moderate	Low	Combined
<i>N</i>	11	9	7	27
<i>Z_s</i>	2.33	3.03	2.80	4.66
<i>p</i>	.00990	.00122	.00256	1.58×10^{-6}
<i>N_{ts}</i>	11	22	13	190

ganization. Similarly, the study of co-acting groups provides an opportunity to explore the effects of leader-subordinate relationships independent of relationships between subordinates. Contrasting co-acting with interacting groups allows for the study of the dynamics of intragroup relationships and their effects on group conflict, performance, and member satisfaction.

Conduct of the present review also pointed to limitations in samples used to validate the contingency model. Since much of the research has been conducted with military, business, and college groups, there is a paucity of research with either very young or very elderly populations. The study of leadership across life span is important given that both individual difference factors (e.g., LPC; Bons, Bass, & Komorita, 1970) and situational factors can vary over time. The study of developmental factors (e.g., birth order; Chemers, 1970) may shed light on the underlying processes accounting for the contingency model's predictions.

Practical implications of the present results should be made with caution. It is important to note that although the combined results are quite robust, the results of any given study are less consistent with respect to within-octant support. Similarly, attempts to apply the model's principles should be sensitive to theoretical and methodological requirements (Fiedler, 1971a; Graen et al., 1971a, 1971b). For example, LPC is a preexisting and relatively unchangeable variable, and the group performance effects are best demonstrated with strong manipulations of the components of situational control; specifically, differences in leader member relations, task structure, and position power should be sizable, not simply statistically significant (Fiedler, 1971a). Moreover, the

results examined here are based on group, not individual, performance (see Rice, 1978). It should also be noted that statistical significance does not necessarily imply practical importance. However, successful efforts by Fiedler and others (Fiedler, Chemers, & Mahar, 1976) to develop and validate (see Fiedler, 1978, for review) a training program based on the model are noteworthy in this regard. Although much work remains, this represents one example of the development, extension, and application of a theory.

In summary, this review provided a precise appraisal of the status of the contingency model of leadership effectiveness. The results provided strong statistical support for the model's prediction. In addition, several areas of new research were indicated. In particular, it is suggested that new research be directed toward a better understanding of situational control as well as of leader and member dynamics through the study of training and co-acting groups. Research with more diverse samples will extend the generalizability of the model and aid in understanding the underlying factors that account for leadership effectiveness. Finally, efforts at applying the model should be continued given the results of this review and the success of the Leader Match training program (Fiedler et al., 1976) reported by Fiedler (1978).

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