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WALLACES WAR AND RANK AMONG NATIVES
A METHODOLOGICAL EXPLANATION

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STATUS INCONSISTENCY
AND
CONFLICT BEHAVIOR IN
INTERNATIONAL RELATIONS

(A Replication of Wallace's War and Rank
Among Nations)

by
Alexius S. Ing

A thesis submitted to the Faculty of
Graduate Studies and Research in
partial fulfillment of the requirements
for the degree of Master of Arts.

Department of Political Science
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September 1979

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A METHODOLOGICAL EXPLORATION

submitted by Alexius Ing, B.A.

in partial fulfillment of the requirements for
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ABSTRACT

This thesis is a replication of Wallace's study linking status inconsistency and status mobility with war involvement in international relations. Data similar to the original study are used, but the analysis is done at the national instead of at the systemic level. Data from eight countries are used. These countries do not constitute a sample of the international community. In fact they constitute the universe of the major powers during the period in question.

In addition to product moment correlation and regression analysis, the method of canonical correlation is used. This method of analysis is useful when there are more than one indicators for the dependent variable.

The product moment correlation results come reasonably close to the results obtained in the original study. However two problems are encountered in the regression analysis, and to a lesser degree also in the canonical correlation analysis. The problems of multicollinearity and autocorrelation pose serious problems in the analysis of the data. The nature of these problems and the appropriate corrective measures taken are dealt with in Chapter three, sections 3.5 and 3.6.

The results tend to indicate the linkage between status inconsistency and war, but in view of the problems mentioned above, a conservative position is taken. Hence it is deemed that the findings of the original study are not substantiated.

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PREFACE

For any student intent on replication, there are no hard and fast rules to follow. When does a replication cease to be one? What degree of changes in the variables, the time span, the sample, and the data collection process, for example, constitutes a change in kind rather than of degree? Basically there are three courses of action one can take. The first option is to faithfully adhere to the same conditions and methods used in the original study. This would merely be a duplication, and very little purpose would be served. A second option is to vary a few of the conditions and see if similar results are still obtained. If they are in fact different, we will at least have an idea of the probable causes of the observed difference. The third course of action is to change all the conditions and methods used in the original study, and try to seek new answers to the question(s) posed in the original study.

In this replication, the second course of action is taken. The level of analysis is changed from the systemic to a unit level; and a slightly different statistical technique is substituted for one of the three techniques used in the original. Similar data are used and the operationalization of concepts are identical to that of the original. It is acknowledged that new theories could have been developed, and different methods of analysis used. Since only a methodological replication is intended, such a radical departure from the original is deemed not necessary. The main purpose is to explore some methodological problems mentioned by Wallace in the original study, and hopefully to suggest viable solutions to them.

CHAPTER ONE

A BRIEF LOOK AT THE ORIGINAL STUDY

1.1 INTRODUCTION

In his book War and Rank Among Nations (1973) M. Wallace tests the relationship between status inconsistency, status mobility and war. From his results, he finds that there is a strong and significant relationship between status inconsistency and war. Status inconsistency in the demographic and military dimensions is especially significant while inconsistency in the industrial dimension does not lead to war. He also finds that the relationship between status inconsistency and war is a long term one. A ten or fifteen years time lag produces a stronger and more significant relationship. Wallace finds low correlations between status mobility and war and using Dependence Analysis he discovers that status mobility leads to status inconsistency. He concludes from this that status mobility leads to status inconsistency, which in turn leads to war. The purpose of this study is to replicate Wallace's work and see if similar or comparable results can be obtained.

In the original study, Wallace draws on a sociological theory linking conflict behavior with an individual's status inconsistency in the community. In the sociological theory, the basic tenet is that social tensions occur when an individual's ranks on two dimensions of social hierarchy are inconsistent. Interactions between individuals of disequilibrated status can often lead to conflictual behavior. An individual with an inconsistent status tends to think of himself in terms of the status dimension in which he ranks highest and expects others to rank him on that dimension. However other individuals will treat him in terms of his lowest status, for their own interests. For example a black doctor and a white laborer are inconsistently ranked in achieved status (occupation and education) and ascribed status (ethnicity). Any social

interaction between them will eventually lead to conflictual behavior as each of them tries to establish the relationship on the basis of the dimension in which he ranks higher.*

This theory has been applied to international politics with the implicit assumption that nations in the international system are analogous to individuals in a social community. The relationship between status inconsistency and conflict has gained some recognition in International Relations studies since the formal theoretical formulation of J. Galtung (1964). According to Galtung's theory a nation's inconsistent status level with regard to three dimensions (i.e. power, economic development and prestige) gives rise to international conflict behavior.

In the sociological context, individuals have attributes that are earned or achieved (e.g. education and occupational skills) and those that are ascribed or imposed by the cultural system (e.g. ethnicity). At the international level a nation's military capability and economic development can be considered as its achieved attributes. A nation can consciously allocate resources to improve its military capability and its economic position. It can rightly harbour a sense of national pride if there is a marked improvement in these attributes. The ascribed attributes are those that a nation cannot easily change. They have to be imposed by other members of the system (i.e. the importance or prestige the other nations attribute to it).

* Lenski, G. Power and Privilege. N.Y. McGraw-Hill, 1966. p. 87

1.2. Wallace's Hypotheses

Wallace's basic hypothesis is that "The greater the inconsistency between a nation's capabilities and the reputational status accorded it in the international system, the greater the likelihood that it will engage in conflict behavior."* Due to a methodological problem (discussed below) Wallace modified this hypothesis to read thus: "The greater the amount of status inconsistency in the international system as a whole the greater the level of conflict that will be experienced within it."**

The indices that Wallace uses to measure achieved attributes are drawn from the demographic, economic and military dimensions. All these indices are considered as alternative measures of power capability. There are five such measures. They are total population, urban population, military expenditure, total number of military personnel and iron and steel production. Wallace notes that in the choice of indices, he tries to maximize the indices' proximity to the concepts they are supposed to measure and at the same time use measures for which data are available. He maintains that if a nation experiences relatively rapid growth on the demographic, economic and military dimensions it may expect its reputational status to rise correspondingly. However it is unlikely that a rapid growth on these dimensions will be followed immediately by an increased reputational status, thus creating an inconsistency in the short run. If the national growth rate on these dimensions rises very rapidly the inconsistency thus created will be correspondingly large. Wallace's hypothesis based on this

* Wallace, M. War and Rank Among Nations. p. 18.

** Ibid. p. 24.

concept is: "The greater the differences among national rates of change on the capability and reputational status dimensions the greater the probability of conflict in the system."*

1.3 The Variables

Wallace uses two indices for his dependent variable, International War. They are Battle-Deaths and Nation-Months. (The former measures the severity of war and the latter measures the magnitude of war.) The data on international war are obtained from Singer and Small (1972) and their criteria for classifying wars are retained. For a conflict to be counted as an international war, at least one participant must be a state member of the international system; and the conflict must involve at least one thousand battle fatalities on both sides; (excluding civilian deaths, and other natural catastrophes). There are two independent variables: status inconsistency and status mobility. Status inconsistency is measured by the difference between the rank positions of two attributes. Using this procedure, Wallace computes the difference between each nation's ascribed status and its achieved status on each of the five dimensions, thus producing five separate indices of status inconsistency. Status mobility is measured by first computing the time rates of change on each variable for each nation and normalizing the absolute change by the sum of the two data values of two time periods. The results are then standardized.

* Wallace, op. cit., p. 27.

Both bivariate and multivariate analysis are used. The bivariate procedure used is the product moment correlation, and the multivariate procedures are stepwise multiple regression and dependence analysis. In the bivariate analysis, the two sets of independent variables are used separately, but in the regression analysis, they are first used separately and then pooled. Wallace's results from the product moment correlations indicate a definite relationship between status inconsistency and the amount of national war involvement (see Tables 1.31 and 1.32). Six out of eight correlations are significant at least at the 0.05 level when no lag is used for the dependent variable. The index on status inconsistency based on the iron and steel production index is only minimally correlated with one of the dependent indices. (Two indices are used for the measurement of war involvement, viz. number of battle deaths and the number of nation-months.) When a lag of five years is introduced, all the correlations become noticeably lower with none significant at the 0.05 level. However it is found that the pattern of relationship essentially remains the same. With a lag of ten years the correlations are comparable to the set of correlations with no lag. As before the iron and steel indicator performs least well. One of the dependent indicators (nation-months) is more highly correlated to the independent variables than the other (battle-deaths). When a lag of fifteen years is employed, the correlations become even more pronounced. Once again the dependent indicator nation-months, performs better than the other. Most of the correlations are also significant at least at the 0.05 level. Among the independent variables, the index based on total population appears to be the best predictor. The index based on iron and steel production, shows much stronger correlations when the fifteen year

Table 1.31

WALLACE'S BIVARIATE RESULTS

Correlations Between Status Inconsistency and National War Involvement Begun									
Period Lag		No Lag		5 Years		10 Years		15 Years	
		NM	BD	NM	BD	NM	BD	NM	BD
1825-1964	TP	.31	** .46	.18	.22	** .49	* .33	** .53	* .43
	UP	.22	* .34	.10	.18	* .39	.26	* .37	.27
	MP	* .37	** .45	.12	.10	* .39	.25	* .39	.28
	IS	.00	.05	.01	.08	.23	.12	** .53	* .42
1825-1944	TP	.32	** .50	.27	.32	* .42	* .41	** .67	** .56
	UP	.16	* .38	.20	.29	.35	.33	* .45	* .36
	MP	* .37	** .53	.27	.24	.33	.33	** .55	* .40
	IS	-.01	.07	.07	.13	.19	.15	** .54	* .17
1825-1919	TP	.16	.28	.25	.24	.37	.38	** .63	.36
	UP	-.13	.05	.02	.15	.19	.16	.34	.14
	MP	.31	.37	.23	.12	.24	.12	* .53	.15
	IS	-.28	-.29	-.17	-.23	-.26	-.32	.12	-.02
1850-1864	TP	.30	* .47	.15	.21	** .52	.33	** .52	* .43
	UP	.31	* .42	.16	.24	** .52	.34	* .49	* .38
	MP	* .39	* .47	.04	.07	* .40	.25	.36	.29
	MX	.28	* .37	.27	.32	** .55	* .46	* .43	.33
	IS	.07	.10	.04	.13	.36	.19	** .63	** .53

- 1) *p is less than .05.
 **p is less than .01.

- 2) Column designations refer to the indices of the dependent variable:
 NM = Nation-months of war involvement begun.
 BD = Battle-deaths from war involvement begun.

- 3) Row designations refer to the indices of the independent variables. In the case of status inconsistency, all designations refer to the discrepancy between a given index and attributed diplomatic importance.
TP = Total population	MX = Military expenditures
UP = Urban population	IS = Iron/Steel production
MP = Military personnel	DP = Attributed diplomatic importance

Table 1.32

5b.

WALLACE'S BIVARIATE RESULTS

Correlations Between Status Mobility and National War Involvement Begun									
Period Lag		No Lag		5 Years		10 Years		15 Years	
		NM	BD	NM	BD	NM	BD	NM	BD
1825-1964	TP	-.06	.10	-.20	-.09	-.05	-.12	.07	.02
	UP	.14	.03	.04	.13	.02	-.10	** .47	.18
	MP	.27	.17	-.06	.04	.08	-.04	.16	.25
	IS	.08	.16	.04	.24	* .42	* .33	** .67	** .50
	DP	.00	.06	-.32	-.21	-.13	-.13	-.10	.04
1825-1944	TP	-.11	.09	.23	-.07	-.19	-.14	.15	.04
	UP	.04	.04	.07	.16	.09	-.06	* .45	.17
	MP	.08	.19	.04	.12	.16	.01	.19	.26
	IS	.08	.18	.07	.28	** .43	* .39	** .72	** .56
	DP	-.10	.06	-.29	-.19	-.11	-.13	-.04	.04
1825-1919	TP	-.25	-.12	-.20	-.02	-.20	-.09	-.11	-.12
	UP	-.07	-.07	.09	.08	.14	-.98	.17	-.12
	MP	.10	.20	.22	.28	.23	.01	-.26	-.09
	IS	-.20	-.12	-.09	.13	* .47	* .50	** .58	* .48
	DP	.00	.22	-.25	-.11	-.17	-.15	-.26	-.18
1850-1964	TP	.16	.34	-.09	-.01	.18	-.06	.30	.19
	UP	.09	.00	.01	.11	-.01	-.13	* .45	.16
	MP	.31	.18	-.11	.03	.02	-.07	.25	.30
	MX	.21	.08	-.12	-.05	.08	.06	* .39	* .39
	IS	-.01	.10	-.07	.20	* .41	.31	** .70	* .50
	DP	.21	.27	-.18	-.19	.04	-.03	.12	.30

1) *p is less than .05.

**p is less than .01.

2) Column designations refer to the indices of the dependent variable:

NM = Nation-months of war involvement begun.

BD = Battle-deaths from war involvement begun.

3) Row designations refer to the indices of the independent variables. In the case of status inconsistency, all designations refer to the discrepancy between a given index and attributed diplomatic importance.

TP = Total population

UP = Urban population

MP = Military personnel

MX = Military expenditures

IS = Iron/Steel production

DP = Attributed diplomatic importance

lag is employed.

The results change radically when status mobility is used as the independent variable. The correlations between the indices of war and the independent variables are minimal. When a five year lag is introduced there appears to be a negative relationship between status mobility and war. When the time lag is extended to a ten year period, there is not much improvement generally; however the index of status mobility, with reference to iron and steel production, becomes fairly strongly correlated with both the indices of war. It is also significant at the 0.05 level. With a fifteen year lag, the situation changes radically. There is a strong status mobility-war relationship. Once again differential capability change based on iron and steel production shows the strongest relationship to war. The index based on urban population also shows a strong relationship to war. Wallace claims that the bivariate analysis results support his hypotheses with the limiting condition that the relationship appears to be maximized if a very long time lag is used.

In the stepwise regression analysis, the results show that the independent variables explain from about one-third to one-half of the variance in nation-months and battle-deaths of war. With no lag in the dependent variable, the variance explained amounts to only about 30 per cent and moves upwards as longer periods of lag are introduced. Once again as in the bivariate analysis, the indices of status mobility predict best when a time lag of 15 years is used. The index based on iron and steel is again the strongest predictor (see Table 1.33). The values of the Durbin-Watson statistic in Table 1.33 indicate that autocorrelation poses a problem. Although only four equations are definitely autocorrelated, at least five others have Durbin-

Watson values that are close to unacceptable. Wallace cautioned that no procedure was undertaken to correct for autocorrelation. This implies that the Ordinary Least Squares procedure may have overestimated the amount of variance explained and also rendered the statistical significance of the results unreliable. Therefore those equations with either low or high values for the Durbin-Watson statistic should be viewed with great caution, and they cannot constitute evidence of a significant relationship between status inconsistency, status mobility and war.

Table 1.33

WALLACE'S REGRESSION RESULTS

Stepwise Regression Equations Predicting from Status Mobility and Status Inconsistency to National War Involvement Begun

Period	Time Lag in Years	Dependent Variable Index	Independent Variable Indices Entered (see key)	Multiple R ²	F-level (P)	Durbin- Watson (d)
1825- 1964	0	Battle- deaths	INCPOP, INCPER, INCSTL	30.0	.039	.88 (p=.01)
			INCPOP, INCSTL, MOBSTL	31.6	.030	.80 (p=.01)
	10	Nation- months	MOBURB, MOBSTL	24.3	.046	2.10
			INCPOP, MOBPOP, MOBURB, MOBSTL	37.9	.041	2.27
	15	Nation- months	MOBURB, MOBSTL	46.9	.001	2.35
INCPOP, INCURB, INCPER, INCSTL			43.5	.023	2.06	
INCSTL, MOBPOP, MOBSTL			55.5	.0009	2.45	
1825- 1944	0	Battle- deaths	INCSTL, MOBSTL, MOBDIP	53.2	.0015	2.24
			MOBURB; MOBSTL	25.5	.012	2.07
			INCSTL, MOBPOP, MOBURB, MOBSTL, MOBDIP	43.8	.048	.76 (p=.025)
	10	Nation- months	INCPOP, INCPER, INCSTL	35.4	.030	.92 (p=.025)
			INCPOP, INCSTL, MOBSTL	33.7	.038	1.22
15	Nation- months	MOBPOP, MOBSTL	27.3	.048	1.76	
		INCPOP, MOBPOP, MOBDIP	47.6	.010	1.81	
			INCSTL, MOBSTL, MOBDIP	62.1	.0008	2.17

Table 1.33 (cont. i)

Period	Time Lag in Years	Dependent Variable Index	Independent Variable Indices Entered (see key)	Multiple R^2	F-level (P)	Durbin- Watson (d)
1825- 1944	15	Nation- months	INCPOP, INCURB, INCSTL	54.4	.003	1.54
			INCPER, INCSTL, MOBSTL	66.7	.0003	2.06
		Battle- deaths	INCPOP, INCURB, INCSTL	30.3	.033	1.43
			INCPOP, INCURB, INCSTL, MOBPOP, MOBURB, MOBSTL, MOBDIP	63.8	.031	.91
1825- 1919	0	Nation- months	INCPOP, INCURB, INCPER, MOBPOP, MOBDIP	56.6	.035	2.29
			INCPOP, INCURB, INCPER, MOBPOP, MOBDIP	64.7	.011	2.17
		Nation- months	INCPOP, INCSTL	35.8	.044	2.01
			MOBPOP, MOBSTL	27.3	.048	1.76
1850- 1964	15	Battle- deaths	INCPOP, INCSTL	43.8	.018	2.43
			INCPOP, INCSTL, MOBSTL	47.7	.033	2.44
		Nation- months	INCPOP, MOBPOP, MOBDIP	50.2	.034	2.37
			MOBPER, MOBSTL	38.2	.043	1.91
1850- 1964	0	Battle- deaths	INCPER, INCSTL, MOBPER, MOBSTL	59.1	.031	1.53
			INCPER, INCSTL	27.2	.048	1.67
		Nation- months	INCPOP, MOBPOP, MOBEXP, MOBSTL	41.4	.048	1.43
			INCPOP, INCPER, INCEXP, INCSTL, INCPOP, INCURB, INCPER, INCEXP, MOBPOP, MOBEXP, MOBSTL	44.4	0.43	2.11
	5	Nation- months	INCPOP, INCURB, INCPER, INCEXP, MOBPOP, MOBEXP, MOBSTL	71.3	.009	2.70

Table 1.33 (cont. ii)

Period	Time Lag in Years	Dependent Variable Index	Independent Variable Indices Entered (see key)	Multiple R ²	F-level (P)	Durbin- Watson (d)
1850- 1964	10	Battle- deaths	INCPER, INCEXP, INCSTL	48.9	.008	2.28
			INCURB, INCPER, INCEXP, INCSTL, MOBPOP, MOBSTL	56.7	.040	1.33
		Nation- months	INCURB, MOBURB, MOBDIP	40.7	.035	2.10
			INCEXP, MOBEXP, MOBDIP	38.1	.048	2.40
			INCPOP, INCPER, INCEXP	42.8	.027	2.80
		Battle- deaths	INCURB, INCPER, INCEXP, MOBPOP, MOBURB, MOBPER	61.6	.028	2.17
			INCPER, INCEXP, INCSTL	42.9	.026	2.44
			INCPER, INCEXP, MOBURB, MOBPER, MOBSTL	58.8	.019	2.78
			INCSTL, MOBSTL, MOBDIP	53.5	.008	2.18
			INCSTL, MOBSTL, MOBDIP	57.4	.004	2.28
	15	Nation- months	MOBPOP, MOBURB, MOBPER, MOBEXP, MOBSTL	68.4	.006	1.38
			INCSTL, MOBSTL, MOBDIP	57.4	.004	2.28
			MOBPOP, MOBEXP, MOBSTL	42.9	.034	1.86

1) Index designations:

INC = Status inconsistency

MOB = Status mobility

POP = Total population

URB = Urban population

PER = Military personnel

EXP = Military expenditures

STL = Iron/Steel production

DIP = Diplomatic importance

2) Where the value of the Durbin-Watson statistic (d) gives conclusive evidence of serially-correlated residuals, the statistical significance of this finding is entered.

CHAPTER II

THE REPLICATION

2.1 The Level of Analysis

Wallace chooses to operate at the systemic level of analysis. The main reason for this choice is the problem of identification with regard to the parameters in the specified equations. In other words there is no unique solution to the equations. (This problem will be dealt with in detail in section 2.2.) Operating at this level detracts from any practical value the analysis might have. Decisions about war initiation are made at the national and not at the systemic level. Even if it is found that a high aggregate level of status inconsistency leads to a high level of conflict behavior, we would not be able to infer that nations that experience status inconsistency do in fact engage in war. On the other hand a low level of conflict in the system does not imply that nations with status inconsistency did not engage in wars more frequently than normal. Conducting the analysis at the systemic level, then, robs the theory of much practical value and policy relevance.

2.2 The Equations

Wallace's basic equations are written as:

$$w = a + b_1x_1 + b_2x_2 + b_3x_3 + e \quad (2.1)$$

$$x_3 = x_1 - x_2 \quad (2.2)$$

where

x_1 = achieved status

x_2 = ascribed status

x_3 = inconsistency between achieved and ascribed status

w = national war involvement

e = error term

Since x_3 is a linear combination of x_1 and x_2 , the parameters in equation (2.1) will be unidentified or under-identified.*

This can be easily seen if equation (2.1) is added to equation (2.2). Thus:

$$w + x_3 = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + x_1 - x_2 + e \quad (2.3)$$

Subtracting x_3 from both sides and factoring,

$$w = a + (b_1 + 1) x_1 + (b_2 - 1) x_2 + (b_3 - 1) x_3 + e \quad (2.4)$$

Equation (2.4) is similar to equation (2.1) except for the coefficients of the x 's. Each of the coefficients in equation (2.4) can take infinitely many values, and therefore there can be no unique solution to the set of equations. In other words the increment in w corresponding to a unit increase in any x cannot be determined. One way of overcoming this problem is to eliminate either x_1 or x_2 , which involves making the assumption that the coefficient of either one of them is equal to zero, which implies that either the achieved status or the ascribed status has no effect on the dependent variable. This of course is contrary to the theory. A more satisfactory way out is to use a non-linear relationship for x_3 in equation (2.2).

Another variable -- stress -- is introduced into the formulation.**

Stress is conceptually defined as the emotional tension in the

* For a discussion of the identification problem, see Econometrics - Wonnacott & Wonnacott. Ch. 8.

** Blalock, H.M. Identification and Theory Building: The Case of Status Inconsistency. American Sociological Review, Vol. 31, 1966, p. 58.

collective decision making body of a nation, brought about by external pressure. It is postulated that the presence of status inconsistency brings on stress, which in turn brings on conflict behavior. A very large inconsistency between dimensions produces proportionately more stress than a smaller amount of inconsistency would. Hence the rationale of making stress the squared function of inconsistency, mathematically defined as:

$$s = x_3^2 - x_3 \quad (2.5)$$

where

s = stress

x_3 = static inconsistency

Ideally a separate study should be done to test the validity of this postulate, and its mathematical definition, but this in itself would be a major study. The relationship between stress and inconsistency can very well be simply $s = x_3^2$. While this latter formulation is simpler than the former one, the relationship $s = f(x^2)$ allows the proportion of stress produced to increase too rapidly. The curve $f(x^2 - x)$ tends to rise less rapidly and hence the rapid increase in stress is mitigated somewhat. Having introduced the variable stress the set of equations is respecified as:

$$w = a + b_1x_1 + b_2x_2 + b_3s + e \quad (2.6)$$

[illegible]

$$x_3 = x_1 - x_2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2.8)$$

where

w = national war involvement

x = achieved status

x_2 = ascribed status

x_3 = inconsistency in status

s = stress produced by status inconsistency

Substituting equation (2.7) and (2.8) into equation (2.6)

$$w = a + b_1 x_1 + b_2 x_2 + b_3 (x_3^2 - x_3) + e \quad (2.9)$$

$$w = a + b_1 x_1 + b_2 x_2 + b_3 [(x_1 - x_2)^2 - (x_1 - x_2)] + e \quad (2.91)$$

$$w = a + b_1 x_1 + b_2 x_2 + b_3 (x_1^2 + x_2^2 - 2x_1 x_2 - x_1 + x_2) + e \quad (2.92)$$

$$w = a + b_1 x_1 + b_2 x_2 + b_3 x_1^2 + b_3 x_2^2 - 2b_3 x_1 x_2 - b_3 x_1 + b_3 x_2 + e \quad (2.93)$$

$$w = a + (b_1 - b_3)x_1 + (b_2 - b_3)x_2 + b_3 x_1^2 + b_3 x_2^2 - 2b_3 x_1 x_2 + e \quad (2.94)$$

Rewriting (2.94)

$$w = a + B_1 x_1 + B_2 x_2 + B_4 x_1^2 + B_5 x_2^2 + B_6 x_1 x_2 + e \quad (2.95)$$

From (2.94) and (2.95)

$$B_1 = b_1 - b_3$$

$$B_2 = b_2 - b_3$$

$$B_4 = b_3$$

$$B_5 = b_3$$

$$B_6 = -2b_3$$

Therefore

$$B_4 = B_5 = -\frac{1}{2} B_6$$

From the final equation (2.95) it is clear that the parameters are identifiable.*

* The coefficients of all the x 's are uniquely determined once the values of b_1 , b_2 and b_3 are determined. The parameters are therefore identifiable.

A nation will experience status inconsistency if there is either a positive or negative disequilibrium in rank. However a nation with a high rank in the achieved status and a low rank in the ascribed status (positive inconsistency) may behave differently from the nation with a low rank in the achieved dimension and a high rank in the ascribed dimension (negative inconsistency). The former may be piqued because its achievement is not acknowledged, while the latter may be quite contented with the system which gives it more esteem than it deserves. The hypotheses dealing with these two aspects of inconsistency will not be tested. Only the symmetrical aspect of inconsistency is tested. Due to this fact a further note on the conceptualization of equation (2.9) is in order. In its operational form equation (2.9) becomes

$$s = [(x_1 - x_2)^2 - |(x_1 - x_2)|] \quad (2.12)$$

To eliminate the negative aspect of inconsistency the absolute value of the quantity $|(x_1 - x_2)|$ is taken. The quantity $(x_1 - x_2)^2$ always remain positive and hence does not pose any problem.

2.3 The Dependent Variable

The measure of international conflict behavior is confined to war, as is that of the original study. War undoubtedly is not the only type of conflict behavior but is the most easily measurable. A measure of conflict behavior that includes other indicators, such as threats, economic sanctions and support of international revolutionary movements perhaps would be more comprehensive, but such indicators are not easily available for the whole time span of the study, although data for such events may be available for a more recent period. Three indicators are used to operationalize the concept of war. They are the frequency of wars, the duration of wars (measured by nation-months) and the magnitude or severity of wars (measured by the number of battle deaths). The first indicator — the frequency of wars — is conceptually more appropriate with regard to the basic hypothesis. However the frequency of war as a variable has very little variability. It is only very rarely that any nation engages in more than a couple of wars during any one time period. The other indices of war though not as conceptually sound, are more statistically appropriate. Not all violent conflicts between states can be classified as wars. The criteria for a conflict to be classified as a war follow closely those set forth in Singer & Small's Wages of War (1972). The main criteria are: (a) the political attributes or status of the participants, (b) the duration of hostilities, (c) the number of troops involved, and (d) the casualties arising from the hostilities. For a conflict to be included as the dependent variable at least one member of the conflict must be the nation in question. This includes imperial or colonial wars as well as wars with other major powers. There must be at least a total of a thousand fatalities; excluding civilian deaths and those caused by diseases and other natural catastrophies.

2.31 The Independent Variables

There are many possible indicators for achieved status which will be referred to as capability hence. A state's capability can be seen in several spheres of activities. Some examples are the economic, military and technological capabilities. However all these spheres of activities are heavily dependent on the demographic make-up of the state. The measure of capability then consists of several somewhat related indicators. The choice of indicators follows closely that of the original. Three capability dimensions will be considered, viz. demographic, economic and military. At least one indicator will be picked for each dimension.

2.32 The Achieved Status

The Demographic Dimension

Three indicators are used in the demographic dimension. They are (1) Total Population, (2) Urban Population and (3) Student Population in universities. Although it can be argued that the total population in absolute numbers is not very important in terms of total capability, it is contended that a large population, though not an achievement in itself, indicates the potential of a nation. It provides a large pool of human resources from which the nation can draw to build up its economic, military and technological capabilities. The urban population should give an indication of the portion of a nation's population that has the knowledge and expertise to make use of the available technology, assuming of course that urbanization is closely linked with technological development. It can be argued that the link between a country's urban population and its level of technological knowledge and expertise is tenuous. The number of technological institutes or the number of technical

journals published annually would be better indicators conceptually. However data of such nature are largely unavailable for the period covered by the study; hence the choice of urban population as an indicator is largely dictated by the availability of data. The next indicator, Total number of university students, is used as a substitute indicator for urban population. This indicator is used for Japan, because statistics on urban population for this country is unreliable. The concepts of urban and rural areas are quite different, especially in the early period of the twentieth century. The total number of university students measures technological development just as well as, if not better than, urban population. Why then is this change of indicator not used for the other major powers as well? For the major European powers it is found that this indicator is highly correlated with the indicator — total population; and hence has to be ruled out as a variable especially in the regression analysis.

2.33 The Economic Dimension

The indicator for economic capability is iron and steel production. The choice of iron and steel production follows the original study. The choice is once again dictated by the availability of reliable data for an extended period of time. Perhaps a use of the country's GNP would be more valid as a measure of economic capability but such data is available for a limited recent period only. To allow for the change in technology, figures for crude iron production, for the period before the turn of the century are used, since iron and steel production figures are not available for the period.

2.34 The Military Dimension

The indicators for military capability are (1) the total number of military personnel, (2) the total amount of military expenditure. The total number of military personnel excludes the military reserves, the police, and other militia forces. It must be pointed out that this indicator does not take into account the quality of the armed forces. A small but well armed and well trained army may be much more capable than a larger but poorly trained or badly disciplined army. A good example of such a contrast are the Israeli and Egyptian armies during the period of the Six-Day War. One other factor may affect the reliability of the indicator. During a war year, the standing army of a country will be abnormally large. One can circumvent this by taking the figures for the previous year, if the data interval happens to fall on a war year. The total amount of military expenditure is used on the rationale that this will give a rough index of the amount and quality of the military hardware. It is noted however that a nation's military expenditure is often not published; and when such figures are published, they are usually 'adjusted' for propaganda or for security reasons. This problem is mitigated however by the fact that the majority of figures for military expenditure are those given by The Stockholm International Peace Research Institute which is supposed to be ideologically neutral. Although even this is debatable.

2.35 The Ascribed Status

The indicator for ascribed status is the number of diplomatic missions in the respective nation's capital. One possible objection to this indicator is that the number of diplomatic missions a nation maintains may

represent an attempt on its part to enhance its own importance and not as an assessment of the 'host' nation's importance. A counter argument is that most nations cannot afford to send missions to all countries in the system. For example if it can only afford to maintain thirty missions, then it will tend to distribute these missions to those countries it deems most important. One other objection to this indicator is that it is not sensitive to changes in the 'host' nation's status; because even if there is a drop in status, diplomatic missions are usually not withdrawn. The withdrawing of diplomatic missions are reserved to show displeasure with the 'host' nation or to indicate outright hostility to the regime. A lack of diplomatic missions in a country's capital does not necessarily reflect a lack of importance. The case of China until recently is a good example. However such cases are the exceptions rather than the rule. Generally this indicator is fairly reliable and easily available.

2.36 Status Inconsistency

The concept of inconsistency is defined as the difference in rank positions between two attributes of a nation. This avoids the loss of variability by dichotomizing the status inconsistency simply into 'high' and 'low' positions; or to use Galtung's original terms of 'top-dog' and 'under-dog' positions. There is also the added disadvantage that multi-variate methods of analysis cannot be used. Alternately status inconsistency can be measured as the difference between standardized scores of two attributes, thus producing a continuous variable or a variable at the interval level of measurement. This resultant measure may be very desirable in a multivariate analysis, but it will be subject to distortions by the different statistical distributions of the

two different attributes. As all the attribute measures are not normally distributed this method of computing the status inconsistency measure is not attempted. Since there are five indicators of achieved status and one indicator of ascribed status, there will be a total of five inconsistency measures. The measure of stress is then computed using the relations in equation (7). As mentioned earlier, only symmetrical inconsistency will be tested. Stress is consequently operationalized by taking the absolute value of the quantity $x_1 - x_2$ in equation (2.9). Hence the quantity $x_1 - x_2$ will always be positive.

2.37 Status Mobility

The index of national status mobility is obtained by first obtaining the difference between time t and $t + 5$ (data collection is at 5-year intervals), and dividing it by the sum of the two data values. The index then varies between -1 and +1.

2.38 The Time-Span

In the original study the time span chosen to test the hypotheses comprised the period from 1825 to 1964. Data for the years 1945 to 1949 were omitted. Data were collected on each of the variables at five year intervals. The time span chosen for the replication is almost identical to that of the original; it includes the period 1815 to 1970 for three countries (France, U.S.S.R., Britain). For the U.S. the time span is from 1875 to 1970. This is dictated by the fact that data for some of the variables are not available for the period prior to 1875. For similar reasons the time span for Italy and

Japan are from 1860 - 1940 and 1895 to 1970 respectively. For the other two countries Germany/Prussia and Austria/Hungary the time spans are 1815 - 1940 and 1815 - 1915 for obvious reasons. Like the original, data are collected at five year intervals. In the original the 140 years span was divided into three overlapping periods 1825 - 1919, 1825 - 1944 and 1850 - 1964. This is not adhered to in the replication. Dividing the time span into sub-intervals only reduces the already small number of cases, further weakening the inferences to be made from the results. In addition, we don't really know what we are controlling for in the sub time span except for some nebulous conjecture. Hence any inference made from these can only be speculations at best.

2.39 The Data Set

Wallace collected his demographic data mainly from the U.N. Demographic Year Book and the Almanach De Gotha supplemented by the Stateman's Yearbook and various monographic sources. For this replication, demographic statistics are mainly from the U.N. Demographic Year Book and the data from Singers' correlate of War project. Other sources are European Historical Statistics 1750 - 1970, B.R. Mitchell, Historical Statistics of the U.S. - Colonial Times to 1970, U.S. Dept. of Commerce, Bureau of the Census.

The data on economic capability are from various sources. The correlate of War Project still provides a major part of them. The other sources are European Historical Statistics 1750 - 1970, Abstract of British Historical Statistics, B.R. Mitchell.

In some cases especially in the earlier period, some countries produced crude iron. Hence for such periods the statistics for pig iron

production are used instead. The figures from some of the sources are estimates. Whenever possible these estimates are compared to estimates from other sources. (Usually they come very close.) The most conservative estimate is usually favored.

Data for the third major component of national capability -- military capacity -- are the most difficult to obtain. Except for the United States, statistics on military expenditure and military personnel are jealously guarded. The main source is the Correlates of War project, supplemented by the following sources: Government Fiscal Activity and Economic Growth in Japan 1868 - 1960, Koichi Emi. (See Bibliography)

In some cases only official statistics are given. It can be argued that these are not reliable for reasons of propaganda or concealment. In such cases estimates from authoritative sources are preferred. For example the Japanese embassy gave a figure of 170,000 military personnel for the years 1955 and 1960. A check revealed * that these were the official figure, whereas the Japanese army had difficulty recruiting personnel. For one reason or another a career in the army was in disrepute at that time. Hence the actual figures were 141,000. On the whole therefore, the data used for this replication resemble the data for the original study. Except for a few different sources they are comparable.

* Area Handbook for Japan. Donald P. Whitaker et al., Foreign Area Studies, American University.

2.391 The Test Population

In selecting a test population of nations it has to be borne in mind that status inconsistency cannot be expected to have any influence on behavior unless there is frequent interaction among the nations concerned. Wallace includes all states that qualify for Central System membership.* This is necessary in his study, since he operates at the systemic level of analysis. Since the study in this paper is at the national level of analysis, it would be more practical to limit the test population to major powers, since for any meaningful operationalization of the equations a sufficient number of war occurrence per nation must be ensured. The major powers have consistently displayed a more active record of war involvement than other members of the system. Limiting the actors to major powers also ensure the fulfilment of the criterion earlier mentioned; i.e. that actors should interact frequently with each other in order for the concept of status inconsistency to be meaningful. As all the major powers interact with each other they are bound to be aware of changes in their respective power and prestige standings. To include all members of the system would imply that all members compete with one another for power and prestige and that all states have the capacity to monitor each other's approximate rank position. All these assumptions are difficult to defend, hence the option to include only major powers. The selection of major powers, as the test population is still quite arbitrary except that it seems conceptually sound to argue that the major powers will normally interact quite freely politically. Ideally the process of selection should be done on the basis of

* See J. David Singer and Melvin Small, The Wages of War (1972), pp. 22-30 for a detailed description of the criteria.

actual figures of the amount of interaction in such areas as trade, diplomatic exchanges, alliances and membership in international organisations. However such an undertaking is a major project itself and the benefit in the context of this study is tenuous.

The criteria for inclusion as a major power follow that of Singer and Small (1972).^{*} The following are considered as major powers. Austria-Hungary (1816-1918), Prussia (1816-1870), Germany (1871-1918, 1925-1945), Russia/U.S.S.R. (1816-1917; 1922-), France (1816-1940; 1945-), Italy (1816-1943), Japan (1895-1945; 1950-), United States (1898-). Since Germany is the successor of Prussia, for the purpose of this study Prussia/Germany is considered as a polity. Although China is included as a major power in Singer's and Small's criteria, it is not included in this study, because of the lack of reliable data on its demographic, economic and especially military dimension. In spite of the much publicised fact about China's huge population, most figures are just somebody's estimate and various estimates differ widely. Figures for its economic and military capabilities are even more unreliable. Hence the number of major powers considered^{is} only eight in number.

^{*} Singer and Small, The Wages of War, p. 23.

CHAPTER III

DATA ANALYSES AND THE RESULTS

3.0 The Analysis

Three analytic techniques are used. They are simple bivariate correlation, canonical correlation and multiple regression. The results of these three techniques are reported separately.

Bivariate Correlation

As mentioned in Chapter II, some of the data are not normally distributed. This poses a dilemma. Should the product moment correlation, the Pearson r , be used in spite of the fact that the crucial assumption of normality is violated? Statistically this is not very sound, as a violation of this assumption may produce biased correlation coefficients (Siegel 1956). Should we then use rank-order correlations which do not make the assumption of normal distribution? The use of product moment correlations lends flexibility, and ease of interpretation. Taking a leaf out of Wallace's book (no pun intended), both techniques are used and the results compared. Fortunately there is not much difference between the two results, although the rank-order coefficients are somewhat lower. However the pattern of correlation is still the same. Therefore in the analysis, the results of the product-moment correlations are used.

3.1 The Bivariate Results I: Status Inconsistency.

Table 3.1 shows the product moment correlations between status inconsistency and the war involvement indicators Battle-Deaths and Nation-Months. There is an appreciable amount of correlation when no time lag is employed. The correlations are very strong for Germany and Austria. All the correlations are significant at the .01 level for Germany, while five are

Table 3.1

23a.

PRODUCT-MOMENT CORRELATIONS BETWEEN STATUS INCONSISTENCY AND WAR

	No Lag		Lag 5		Lag 10		Lag 15	
	BD	NM	BD	NM	BD	NM	BD	NM
France (N = 32)								
Expend	-.10	.13	-.08	*.76	-.05	** .73	.01	** .88
Popul	.08	.30	.08	** .49	.19	** .73	.25	** .79
Urban	.14	*.40	.18	** .49	.27	** .64	*.37	** .65
Milit	-.22	** .88	.13	** .67	.08	.31	.03	.06
Steel	-.09	.16	-.04	** .47	.09	** .80	.11	** .88
USSR (N = 32)								
Expend	-.03	-.17	.05	-.13	.14	-.08	.09	-.10
Popul	.10	-.05	.14	-.01	.25	.08	.35	.18
Urban	-.04	-.19	.22	-.16	.07	-.11	.33	.04
Milit	.16	-.14	*.38	-.04	** .48	.03	*.39	.04
Steel	-.08	-.19	.04	-.17	.04	-.12	.17	-.05
UK (N = 32)								
Expend	-.06	-.03	-.03	.02	.05	.06	.001	.24
Popul	.17	.01	.22	.10	.26	.19	.31	.28
Urban	.18	.04	.23	.13	.28	.19	.34	.28
Milit	.17	** .46	.19	** .45	.01	.03	-.02	-.06
Steel	-.05	-.17	-.04	-.06	-.01	.10	.07	.31
US (N = 20)								
Expend	-.09	-.13	-.04	-.06	.12	.10	.27	.38
Popul	.05	-.07	.18	.07	.28	.22	.39	.39
Urban	.04	-.07	.14	.05	.27	.20	.40	.35
Milit	*.49	.31	.00	-.05	-.44	.24	.27	.15
Steel	.10	.04	.22	.06	.44	.32	.25	.19
Germany (N = 26)								
Expend	** .80	** .66	-.06	-.07	-.06	-.07	-.03	-.04
Popul	** .59	** .57	.31	.29	.31	.29	.36	.35
Urban	** .68	** .63	.34	.31	.38	.35	*.48	*.45
Milit	** .77	** .71	-.13	-.15	-.21	-.23	-.03	-.04
Steel	** .83	** .78	.24	.21	.15	.12	.30	.27
Austria (N = 21)								
Expend	** .70	** .62	.08	-.09	.01	.01	-.11	-.09
Popul	*.54	*.48	-.13	-.13	-.12	-.12	-.07	-.07
Urban	** .59	*.51	-.17	-.17	-.13	-.14	-.08	-.09
Milit	.16	.26	.12	-.14	-.28	-.23	-.11	-.13
Steel	** .76	** .69	-.15	.13	-.15	-.13	-.13	-.10
Italy (N = 17)								
Expend	.02	** .65	-.08	-.15	-.01	-.09	.09	.04
Popul	.25	.36	.28	.16	.31	.27	.41	.39
Urban	.16	.40	.36	.14	.35	.29	.45	.42
Milit	.05	.33	** .60	.13	.10	.09	.15	.12
Steel	-.03	.31	.28	.44	.26	.24	*.54	.50

Table 3.1 (cont.)

		No Lag		Lag 5		Lag 10		Lag 15	
		BD	NM	BD	NM	BD	NM	BD	NM
Japan (N = 16)									
Expend		-.08	-.17	-.08	-.17	-.08	-.17	-.08	-.17
Popul		.07	-.17	.15	-.03	.27	.14	.36	.31
Urban		.11	-.25	-.10	-.23	-.05	.18	.02	-.10
Milit		** .74	** .76	-.01	.18	-.10	-.18	-.16	-.24
Steel		-.11	-.21	-.11	-.21	-.16	-.20	-.05	-.16

*p is less than 0.05.

**p is less than 0.01.

NM = Nation-months of war involvement

BD = Total battle-deaths

EXPEND = Military expenditure

POPUL = Total population

URBAN = Urban population

MILIT = Military personnel

STEEL = Iron/Steel production

significant at the .1 level, and three at the .05 level for Austria. Status inconsistency based on military personnel turns out to be significant at least at the .05 level for five out of the eight countries. For the U.S.S.R., the U.S. and Japan, almost all the correlations (except for military personnel), are negative. This confirms Wallace's findings that status inconsistency based on military personnel is the best predictor of war involvement. Most of the negative correlations appear with the duration of war indicator. Like the original study the status inconsistency based on iron and steel production turns out negative or close to zero. Obviously iron and steel production is not a good indicator of economic capability for the no-lag period. Perhaps the use of pig iron production for the nineteenth century and steel production statistics for the twentieth century, compromises the indicator.

When a five year lag is introduced the correlation coefficients fall perceptibly lower. Except for France, very few of the coefficients are statistically significant. The decrease in relationship for the five year lag parallels or confirms Wallace's results.

With a ten year lag, the correlation coefficients increase in value, to a level comparable to those with no lag. However the strong relationship found for Germany and Austria are no longer apparent. The coefficients for France turn out to be very strong and statistically significant at the .01 level. For all other countries the increase in correlation is only very slight for the ten year lag, although the military personnel indicator still proves relatively stronger than the others. The pattern of negative results carry over from the period with no lag. Except for France and except for one indicator for the U.S.S.R., none of the coefficients for the period is

statistically significant.

When a fifteen year lag is introduced, the correlation coefficients for seven out of the eight countries improves appreciably. (The odd country out is Japan.) The coefficients for France are statistically significant at the 0.01 level. The largest correlation is 0.88 and is significant at the 0.01 level. However the status inconsistency indicator based on military personnel has low correlations (0.06) and are not statistically significant. The indicator based on total population does the best. The military personnel index is no longer as important as it was with no lag. The iron and steel production indicator has improved in strength generally. Although there is an overall improvement using the 15 years lag, there is no clear pattern of improvement among the different indices. One would expect the industrial and military indicators to improve concomitantly. All these suggest that any improvement in the correlations are the result of the procedure used.

3.2 Bivariate Results II: Status Mobility

When status mobility is used as a predictor variable the correlations are generally weak (Table 3.2). With no time lag employed, only nine of the correlations are statistically significant at the .05 level. The best indicators are the ones based on iron and steel production and military expenditure. Military expenditure as an indicator is especially strong for Japan, where it is 0.75 and significant at the .01 level. Negative correlations are no longer confined to some countries as with the status inconsistency indicators; but are present in all countries.

With a time lag of five years, the relationship becomes very weak,

Table 3.2

PRODUCT-MOMENT CORRELATIONS BETWEEN STATUS MOBILITY AND WAR

	No Lag		Lag 5		Lag 10		Lag 15	
	BD	NM	BD	NM	BD	NM	BD	NM
France (N = 32)								
MOBEXP	-.31	-.16	-.22	-.15	.06	-.01	-.03	.06
MOBPOP	.09	.10	.08	.09	.05	.08	.06	.08
MOBURBAN	.08	.16	.09	.14	.05	.12	.06	.12
MOBMIL	.06	.11	.15	.28	.16	*.38	.16	.32
MOBSTEEL	.19	-.02	.05	-.09	-.22	.00	.17	.19
USSR (N = 32)								
MOBEXP	-.27	-.05	-.06	-.11	-.05	-.19	.05	-.16
MOBPOP	.19	.22	.04	.14	.03	.10	.03	.10
MOBURBAN	.22	.28	.00	.10	.03	-.01	-.14	-.07
MOBMIL	-.05	.10	.02	.13	.02	.03	.01	-.08
MOBSTEEL	*.35	** .51	-.06	.15	-.13	-.22	-.14	-.14
UK (N = 32)								
MOBEXP	*-.41	*-.41	-.26	-.05	.21	.22	.14	-.04
MOBPOP	.07	.14	.06	.13	.07	.14	.06	.14
MOBURBAN	.09	.16	.09	.17	.10	.20	.10	.19
MOBMIL	-.14	*-.36	.04	.05	.18	.31	.07	.09
MOBSTEEL	.06	-.01	.18	.11	.18	.12	.08	.33
US (N = 20)								
MOBEXP	**-.58	-.30	.16	.21	-.03	.10	.08	-.15
MOBPOP	.12	.15	.05	.10	.08	.12	.09	.14
MOBURBAN	.08	.12	.09	.13	.09	.14	.11	.17
MOBMIL	*-.50	-.43	.45	*.45	.10	.00	.21	.11
MOBSTEEL	.04	-.06	.09	.09	.11	.14	.31	.32
Germany (N = 26)								
MOBEXP	-.27	-.21	.22	.23	.02	.04	-.32	-.32
MOBPOP	.07	.09	.15	.15	.12	.13	.09	.10
MOBURBAN	.11	.13	.16	.16	.14	.15	.11	.12
MOBMIL	.00	.05	** .56	** .57	.38	*.39	-.28	-.29
MOBSTEEL	.13	.17	.36	.36	.33	.32	.14	.14
Austria (N = 21)								
MOBEXP	.01	.08	-.09	-.10	.02	-.02	.27	.27
MOBPOP	.05	.08	.09	.09	.10	.10	.09	.08
MOBURBAN	.07	.09	-.02	-.02	.02	.01	.04	.04
MOBMIL	.03	.02	.11	.15	.26	.22	-.02	.01
MOBSTEEL	.07	.11	.02	.02	.12	.05	.08	.16
Italy (N = 17)								
MOBEXP	.35	-.14	.10	.19	-.07	.07	-.03	-.03
MOBPOP	.04	-.16	.06	.11	.08	.11	.06	.13
MOBURBAN	.06	-.15	.03	.09	.08	.12	.08	.13
MOBMIL	.16	-.14	-.08	.03	.20	.25	.06	.11
MOBSTEEL	.21	.02	-.16	-.12	.13	.10	.04	.11

Table 3.2 (cont.)

	No Lag		Lag 5		Lag 10		Lag 15	
	BD	NM	BD	NM	BD	NM	BD	NM
Japan (N = 16)								
MOBEXP	.09	-.16	.38	.22	.20	.46	.11	.27
MOBPOP	.08	.10	.08	.17	.08	.16	.09	.17
MOBURBAN	.16	.23	.17	.29	.04	.18	.06	.18
MOBMIL	.07	.01	** .71	.70	.02	.33	.06	.09
MOBSTEEL	** .75	** .67	.24	.42	-.14	.01	-.13	-.18

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

MOBEXP = Status mobility in military expenciture

MOBPOP = Status mobility in total population

MOBURBAN = Status mobility in urban population

MOBMIL = Status mobility in military personnel

MOBSTEEL = Status mobility in Iron/Steel production

with only four of the coefficients statistically significant. The same pattern of negative relationships as the no lag period holds. When a time lag of ten years is employed, the weak relationship essentially remains unchanged. This time only two of the coefficients are significant, at the .05 level. None of the indicators stand out as performing better than the others.

The indicators do not fare any better when a fifteen year lag is used, although the odd indicators improve slightly here and there. The pattern of improvement is erratic and generally therefore no improvement can really be discerned. None of the correlation coefficients ^{is} statistically significant. On the whole the status mobility indicator seems to perform best when no time lag is used.

The two sets of indicators of status inconsistency and status mobility have performed differently in the bivariate analysis. In the case of status inconsistency, the results come very close to Wallace's study. With no time lag there is evidence of a relationship between status inconsistency and the onset of war. Military personnel stands out as the best indicator, while iron and steel production is the worst. Again this aspect of the results parallel Wallace's findings. However one discrepancy is apparent at this point. While Wallace finds that total population is a good predictor, this does not seem to be the case with our results. The results with a time lag of five years again come close to Wallace's findings. There is agreement that the statistical relationship weakens considerably with no indicators standing out above the others. The results are still comparable to Wallace's with a ten year lag, although he finds the indicator, total population, to perform well; while our results favor military personnel as the indicator for this period.

Our results with a fifteen year time lag are not as spectacular as Wallace's. Although there is some improvement in the correlation coefficients, the margin of improvement is not as great. Again there is agreement about the performance of individual indicators. Wallace's assessment, of the index based on total population, as being the best predictor for this period is confirmed. Likewise the improvement of the index based on iron and steel production and the decline of the index based on military personnel as predictor variables are verified. Thus on the whole, Wallace's results dealing with the product moment correlations of status inconsistency and war involvement is confirmed. The results have also shown that status inconsistency is a better predictor than status mobility.

3.3 Multivariate Analysis

Canonical Correlation.

The bivariate analysis indicated a relationship between the various indicators of the independent variables and the indicators of war. In this section we will examine the joint effects of the independent indicators and the resultant correlation with all the indicators of war.

Canonical correlation is especially suited to a situation in which there are two or more variables in each of the dependent and independent variables; and the researcher is interested in examining the relationship between the two sets of variables. Essentially canonical correlation is an extension of regression analysis. The only difference is that in canonical analysis a set of variables is given a least square fit to another set of variables. In other words, ordinary regression analysis is a special case of canonical correlation analysis when one of the sets contain only one variable.

The object of the procedure is to construct two sets of canonical variates which are linear combinations of the variables in the respective sets. The pair of canonical variates that has the highest correlation, is then selected and constitutes the first variates. A second pair of variates (orthogonal to the first pair) that accounts for the maximum amount of variance left unaccounted for by the first pair, is then selected. Subsequent pairs are similarly selected. The number of canonical variates cannot exceed the number of variables in the smaller of the two sets of variables.* The canonical variates can be interpreted by examining the contribution of each variable from the two sets of variables. The problem in interpretation is to determine whether the variates have any intuitive meaning. In other words, whether they correspond to anything real or whether they are just meaningless mathematical contrivances. The interpretation of the first canonical variate is usually simple enough; but giving a meaningful interpretation to subsequent variates is conceptually more difficult. Usually only the first variate is interpreted.

The procedure produces two sets of statistics. One set of statistics deals with the amount of correlation between corresponding pairs of canonical variates and the amount of variance accounted for. The amount of variance that is explained is given by the eigenvalue which is analogous to the r^2 in regression analysis. The other set of statistics shows the coefficient of each variable in the composition of each variate. These coefficients or weights indicate the importance or contribution of each variable in the formation of each variate from the respective set of variables.

* For a short formal presentation, please see Appendix I.

3.4 Canonical Correlation Results

Bartlett's chi-square test of significance is used. The first hypothesis tested states that no canonical relation exists between the two sets of variables. If this is rejected, then the next hypothesis tested is that exactly one canonical relation exists, the next that exactly two exists and so on.

Tables 3.41 - 3.44 give the canonical correlations for two pairs of variates (only Germany and Italy) as well as the canonical coefficients for the first pair of variates for all eight countries. Only the first pair of variates will be interpreted for all the countries. The first canonical correlation for France is surprisingly high ($R_c = .91$) and accounts for 83% of the total variance. It is also statistically significant at less than the .001 level. The second canonical correlation is not statistically significant at the minimum .05 level and is hence not interpreted as it can be argued that it is a mere mathematical artifact of the procedure. The canonical coefficients or weights of the independent vector show that status inconsistency based on the military dimension (military personnel and military expenditure) is the most important predictor, followed by that based on steel production. The best predictor of the dependent vector is the duration of wars (nation-months) followed by the frequency of wars. The canonical correlations for four other countries are also very high and statistically significant at the .01 level. They are the United States ($R_c = .93$), Prussia/Germany ($R_c = .98$), Austria/Hungary ($R_c = .84$) and Italy ($R_c = .97$). Looking at the weights of the independent variables, for these countries, it can be seen that the variables in the military dimension (military personnel and military expenditure) load consistently high, followed by the variable steel production. Turning to the

CANONICAL CORRELATIONS
INDEPENDENT VARIABLES - STATUS INCONSISTENCY

France

Variate	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.829	.91	57.27	15	.00
2	.259	.51	10.47	8	.23

Canonical Coefficients

Independent		Dependent	
Expend	-.934	Battle-deaths	-.027
Popul	.081	Nation-months	-1.227
Urban	.112	Wars	0.334
Steel	.867		
Military	-1.112		

USSR

Variate	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.199	.447	9.88	15	NS
2	.107	.327	3.98	8	NS

Canonical Coefficients

Independent		Dependent	
Expend	13.398	Battle-deaths	1.186
Popul	-0.669	Nation-months	-0.682
Urban	12.061	Wars	-0.026
Steel	-22.271		
Military	-2.888		

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

EXPEND = Military expenditure

POPUL = Total population

URBAN = Urban population

MILITARY = Military personnel

STEEL = Iron/Steel production

Table 3.42

CANONICAL CORRELATIONS

INDEPENDENT VARIABLES - STATUS INCONSISTENCY

UK

Variate	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.301	.549	17.59	15	NS
2	.219	.468	8.10	8	NS

Canonical Coefficients

Independent		Dependent	
Expend	-1.263	Battle-deaths	-0.236
Popul	-1.602	Nation-months	0.992
Urban	0.986	Wars	0.141
Steel	1.133		
Military	1.398		

US

Variate	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.863	.929	31.42	15	.008
2	.132	.364	2.59	8	NS

Canonical Coefficients

Independent		Dependent	
Expend	-0.233	Battle-deaths	-0.669
Popul	-2.926	Nation-months	-1.057
Urban	4.045	Wars	0.775
Steel	0.692		
Military	-2.028		

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

EXPEND = Military expenditure

POPUL = Total population

URBAN = Urban population

MILITARY = Military personnel

STEEL = Iron/Steel production

Table 3.43

29c.

CANONICAL CORRELATIONS

INDEPENDENT VARIABLES - STATUS INCONSISTENCY

Germany

Variate	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.966	.983	89.25	15	.000
2	.586	.766	20.02	8	.01

Canonical Coefficients

Independent		Dependent	
Expend	-0.937	Battle-deaths	-3.58
Popul	-0.134	Nation-months	3.00
Urban	0.302	Wars	-0.33
Steel	-0.266		
Military	0.313		

Austria/Hungary

Variate	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.699	.836	27.34	15	.03
2	.326	.571	8.73	8	NS

Canonical Coefficients

Independent		Dependent	
Expend	0.957	Battle-deaths	0.905
Popul	-0.946	Nation-months	0.310
Urban	-0.187	Wars	-0.157
Steel	1.020		
Military	0.034		

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

EXPEND = Military expenditure

POPUL = Total population

URBAN = Urban population

MILITARY = Military personnel

STEEL = Iron/Steel production

CANONICAL CORRELATIONS
INDEPENDENT VARIABLES - STATUS INCONSISTENCY

Italy

Variate	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.973	.986	60.56	15	.00
2	.733	.856	19.10	8	.01

Canonical Coefficients

Independent		Dependent	
Expend	-.934	Battle-deaths	-.027
Popul	.081	Nation-months	-1.227
Urban	.112	Wars	0.334
Steel	.867		
Military	-1.112		

Japan

Variate	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.760	.872	17.70	15	NS
2	.222	.471	2.67	8	NS

Canonical Coefficients

Independent		Dependent	
Expend	-2.493	Battle-deaths	-0.397
Popul	0.578	Nation-months	0.184
Urban	-2.918	Wars	-0.872
Steel	5.047		
Military	-0.997		

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

EXPEND = Military expenditure

POPUL = Total population

URBAN = Urban population

MILITARY = Military personnel

STEEL = Iron/Steel production

weights of the dependent variables, for the same five countries, we find that the duration of war (Nation-Months) and the severity of war (Battle-Deaths) do, equally well as criterion variables, with the frequency of wars a distant third. This latter fact is probably because the frequency of wars as a variable lacks variability. It alternates between 0 and 1 and rarely goes to 2. The canonical correlations for the U.S.S.R., Britain and Japan are not statistically significant, although the correlations themselves are fairly high (0.45, 0.55 and 0.87 respectively). Although there seems to be a relationship between status inconsistency and war for these countries no firm conclusion can be made for them. However, for the five countries previously mentioned, it is possible to tentatively conclude that when a country's achievements in the military and economic dimensions are not acknowledged by the appropriate recognitions, from the other members of the system, it tends to engage in conflict.

Tables 3.45 - 3.48 show the canonical correlations of status mobility and war. The canonical correlations for six out of the eight countries are high and statistically significant at the .02 level. They are, France ($R_c = 0.62$), U.S.S.R. ($R_c = 0.78$), Britain ($R_c = 0.80$), United States ($R_c = .90$), Italy ($R_c = .90$) and Japan ($R_c = 0.95$). The amount of variance is also very high. It ranges from a low of 39% (France) to a high of 90% (Japan). Among the independent variables, status mobility based on the total population and urban population load consistently high in the six countries. Among the dependent variables, the duration and severity of wars perform much better. For Prussia/Germany and Austria/Hungary, the canonical correlations are high but not statistically significant at an acceptable level.

CANONICAL CORRELATIONS
INDEPENDENT VARIABLES - STATUS MOBILITY

France

Variates	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.388	.623	27.86	15	.02
2	.285	.534	14.86	8	.06

Canonical Coefficients

Independent		Dependent	
MOBEXP	1.05	Battle-deaths	-0.66
MOBPOP	2.67	Nation-months	-1.01
MOBURBAN	-3.32	Wars	0.73
MOBSTEEL	-0.78		
MOBMIL	0.51		

USSR

Variates	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.608	.780	29.31	15	.02
2	.099	.315	4.48	8	NS

Canonical Coefficients

Independent		Dependent	
MOBEXP	0.62	Battle-deaths	-0.64
MOBPOP	-0.50	Nation-months	-0.37
MOBURBAN	-0.56	Wars	-0.20
MOBSTEEL	-1.46		
MOBMIL	0.64		

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

MOBEXP = Status mobility in military expenditure

MOBPOP = Status mobility in total population

MOBURBAN = Status mobility in urban population

MOBMIL = Status mobility in military personnel

MOBSTEEL = Status mobility in iron/steel production

CANONICAL CORRELATIONS
INDEPENDENT VARIABLES - STATUS MOBILITY

UK

Variates	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.640	.800	37.39	15	.001
2	.265	.514	10.34	8	NS

Canonical Coefficients

Independent		Dependent	
MOBEXP	-0.59	Battle-deaths	0.04
MOBPOP	1.61	Nation-months	1.06
MOBURBAN	-0.17	Wars	-0.13
MOBSTEEL	-0.37		
MOBMIL	-0.96		

US

Variates	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.808	.899	27.63	15	.02
2	.189	.435	3.67	8	NS

Canonical Coefficients

Independent		Dependent	
MOBEXP	0.57	Battle-deaths	-0.93
MOBPOP	-1.94	Nation-months	0.64
MOBURBAN	1.12	Wars	-0.87
MOBSTEEL	-0.09		
MOBMIL	0.75		

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

MOBEXP = Status mobility in military expenditure

MOBPOP = Status mobility in total population

MOBURBAN = Status mobility in urban population

MOBMIL = Status mobility in military personnel

MOBSTEEL = Status mobility in iron/steel production

CANONICAL CORRELATIONS
INDEPENDENT VARIABLES - STATUS MOBILITY

Germany

Variates	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.384	.620	14.06	15	NS
2	.166	.408	4.13	8	NS

Canonical Coefficients

Independent		Dependent	
MOBEXP	-1.68	Battle-deaths	2.72
MOBPOP	-0.41	Nation-months	-1.91
MOBURBAN	1.26	Wars	0.11
MOBSTEEL	0.02		
MOBMIL	0.64		

Austria/Hungary

Variates	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.602	.776	17.84	15	NS
2	.192	.438	3.57	8	NS

Canonical Coefficients

Independent		Dependent	
MOBEXP	1.24	Battle-deaths	6.01
MOBPOP	2.09	Nation-months	-7.09
MOBURBAN	-5.13	Wars	2.67
MOBSTEEL	1.33		
MOBMIL	0.93		

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

MOBEXP = Status mobility in military expenditure

MOBPOP = Status mobility in total population

MOBURBAN = Status mobility in urban population

MOBMIL = Status mobility in military personnel

MOBSTEEL = Status mobility in iron/steel production

CANONICAL CORRELATIONS
INDEPENDENT VARIABLES - STATUS MOBILITY

Italy

Variates	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.804	.897	31.98	15	.006
2	.665	.816	13.22	8	NS

Canonical Coefficients

Independent		Dependent	
MOBEXP	-0.58	Battle-deaths	0.02
MOBPOP	-3.94	Nation-months	-0.65
MOBURBAN	3.71	Wars	1.31
MOBSTEEL	-0.10		
MOBMIL	-0.19		

Japan

Variates	Eigenvalue	Canonical Corr.	Chi Sq.	DF	Sig.
1	.901	.949	38.15	15	.001
2	.587	.766	13.91	8	.08

Canonical Coefficients

Independent		Dependent	
MOBEXP	-0.33	Battle-deaths	0.39
MOBPOP	-1.37	Nation-months	0.54
MOBURBAN	1.17	Wars	0.15
MOBSTEEL	1.11		
MOBMIL	-0.36		

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

MOBEXP = Status mobility in military expenditure

MOBPOP = Status mobility in total population

MOBURBAN = Status mobility in urban population

MOBMIL = Status mobility in military personnel

MOBSTEEL = Status mobility in iron/steel production

3.5 Different Time-lags

An interesting pattern emerges when different time lags^{are} introduced into the computation. Table 3.51 shows the canonical correlations of status inconsistency with differently lagged dependent variables. When a five year lag is used, the canonical correlations decrease perceptibly and only four of the eight correlations are statistically significant. There is one deviation from the pattern however. The canonical correlation for U.S.S.R. increases and becomes statistically significant at the .05 level, where formerly it was not. With a lag of ten years the canonical correlations increase to about the same level as when there is no lag. When a fifteen year time lag is used, the correlations increase somewhat, but more of them are statistically significant. This pattern of increase confirms the result obtained in the bivariate analysis. However two interesting points arise here. With ~~the~~ longest time lag, the canonical correlation for the U.S.S.R. becomes stronger and statistically significant at the .01 level. The opposite is true of Austria/Hungary and Italy. The canonical correlations drop to insignificance.

When both status inconsistency and status mobility are included in the computation for canonical correlations, the results improve somewhat (Table 3.49). The canonical correlations for all countries improve. The lowest canonical correlation is 0.83 (U.S.S.R.) and they are statistically significant (.05 level or less) for five countries. However for two other countries (Austria/Hungary and Japan) the canonical correlations are significant at the .08 and .07 level respectively. In the remaining country (U.S.S.R.) the result is statistically not significant. Turning to the weights in the variates, there appears to be one clear winner for best predictor -- status inconsistency

Table 3.49

31a.

BOTH STATUS INCONSISTENCY AND STATUS MOBILITY INCLUDED

CANONICAL CORRELATIONS

WITH NO TIME LAG

Variate	Canonical Corr.	Eigenvalue	Chi Sq.	DF	Sig.
France					
1	.93	.87	71.95	30	.000**
2	.63	.40	22.62	18	NS
3	.59	.35	10.33	8	NS
USSR					
1	.826	.68	37.65	30	NS
2	.50	.25	10.10	18	NS
3	.35	.12	3.09	8	NS
UK					
1	.89	.79	53.57	30	.005**
2	.63	.41	16.30	18	NS
3	.38	.15	3.83	8	NS
US					
1	.96	.93	48.60	30	.017*
2	.80	.64	16.64	18	NS
3	.54	.29	4.19	8	NS
Germany/Prussia					
1	.99	.97	94.96	30	.000**
2	.84	.71	25.46	18	NS
3	.39	.15	3.10	8	NS
Austria/Hungary					
1	.88	.78	41.20	30	NS
2	.78	.61	21.24	18	NS
3	.71	.50	9.13	8	NS
Italy					
1	.99	.997	88.42	30	.000**
2	.97	.947	35.90	18	.007**
3	.81	.649	9.45	8	NS
Japan					
1	.97	.95	41.79	30	.07
2	.87	.75	18.18	18	NS
3	.77	.59	7.14	8	NS

* sig. at .05 level

** sig. at .01 level

based on the military expenditure. The next best seems to be status mobility based on the total population (Table 3.491). This finding therefore supports the earlier findings when status inconsistency and status mobility are treated separately as the time lags increase. Thus for six of the eight powers considered (France, U.S.S.R., U.K., U.S., Germany and Japan) status inconsistency becomes highly correlated with war after a long time lag, while for the remaining two powers (Austria/Hungary and Italy) the canonical correlations weaken with the passage of time. This suggests that the reaction time to status inconsistency is not the same in all countries. (Table 3.51)

Using status mobility as the independent variable and using time lags, the canonical correlations decrease in value (Table 3.52). With a time lag of five years all the correlations decrease substantially. They decrease slightly more with a ten year lag. This time none of the relations are statistically significant at even the .05 level. Essentially the same pattern holds when a fifteen year time lag is introduced. The canonical correlations decrease further and are not significant statistically. It will be recalled that the same pattern exists in the bivariate analysis.

3.6 Multiple Regression

In using the multiple regression procedure with the data, two problems emerge. They are multicollinearity and autocorrelation. We will first deal with multicollinearity briefly.

By assumption the regression model requires that none of the independent variables be perfectly correlated with any of the others, or with any linear combination of the other independent variables. In other words all

Table 3.491

INDEPENDENT VARIABLES STATUS INCONSISTENCY AND STATUS MOBILITY

LOADINGS OF VARIATES

	France	USSR	UK	US	Germany	Austria	Italy	Japan
	**		**	*	**	Sig. = .08	**	S = .07
EXPEND	-0.88	-0.97	-2.43	-0.22	0.92	1.04	0.92	-0.76
POPUL	0.02	-0.59	-1.38	-3.72	-0.15	-4.95	1.07	0.84
URBAN	0.29	-0.46	1.09	4.39	0.15	4.14	-0.37	-3.85
STEEL	0.78	1.78	2.38	1.01	0.07	0.35	-0.42	3.44
MILITARY	-1.22	0.17	0.56	-2.00	0.10	-0.50	-0.35	-0.02
MOBEXP	-0.14	-0.35	-0.68	0.33	0.10	-0.82	0.11	-0.53
MOBPOP	-0.51	-0.14	2.08	-1.14	0.18	0.58	3.13	1.41
MOBURBAN	-0.07	0.57	-0.59	1.00	-0.36	0.64	-2.51	-1.91
MOBSTEEL	-0.29	-1.61	-0.24	-0.33	-0.03	0.46	0.03	1.36
MOBMIL	-0.12	-0.63	-1.11	-0.33	0.07	-0.39	-0.54	-0.10
Battle-deaths	-0.00	-0.62	0.23	-0.73	3.60	1.47	-0.96	0.58
Nation-months	-1.32	-0.39	0.90	-1.00	-3.03	-0.50	1.98	0.52
Wars	0.47	-0.20	-0.06	0.81	0.33	-0.19	-1.26	-0.06

*p is less than 0.05

**p is less than 0.01

NM = Nation-months of war involvement

BD = Total battle-deaths

EXPEND = Military expenditure

POPUL = Total population

URBAN = Urban population

MILITARY = Military personnel

STEEL = Iron/Steel production

MOBEXP = Status mobility in military expenditure

MOBPOP = Status mobility in total population

MOBURBAN = Status mobility in urban population

MOBMIL = Status mobility in military personnel

MOBSTEEL = Status mobility in Iron/Steel production

Table 3.51

COMPARISON OF CANONICAL CORRELATIONS WITH DIFFERENT
TIME-LAGS (STATUS INCONSISTENCY)

	No Lag	Lag 5 Years	Lag 10 Years	Lag 15 Years
France	.91**	.88**	.86**	.93**
USSR	.45	.67*	.70*	.73**
UK	.55	.57	.65	.73**
US	.93**	.59	.70	.89**
Germany	.98**	.81**	.85**	.81**
Austria/Hungary	.84*	.43	.68	.25
Italy	.98**	.87*	.79	.82
Japan	.87	.48	.96**	.82

* sig. at .05 level

** sig. at .01 level

Table 3.52

COMPARISON OF CANONICAL CORRELATIONS WITH TIME LAGS

INDEPENDENT VARIABLE - STATUS MOBILITY

	No Lag	Lag 5 Years	Lag 10 Years	Lag 15 Years
France	.62*	.58	.61	.55
USSR	.78*	.37	.62	.66*
UK	.80**	.53	.49	.45
US	.90*	.66	.31	.56
Germany	.62	.78*	.66	.65
Austria/Hungary	.78	.70	.65	.67
Italy	.89**	.60	.73	.36
Japan	.94**	.89*	.66	.63

*statistically significant at .05 level

**significant at .01 level

the independent variables should be orthogonal. When this assumption is violated there is perfect multicollinearity. When there is perfect multicollinearity, the regression coefficients cannot be calculated.* Conversely, when all the independent variables are indeed orthogonal, there is an absence of multicollinearity. The cases in between are described as exhibiting various degrees of multicollinearity and this is usually the problem encountered in research. The problem of multicollinearity then boils down to a question of degree rather than of kind. When there is a high degree of multicollinearity it becomes impossible to estimate the unique effects of individual variables in the regression equation. A standard rule of thumb used for detecting multicollinearity calls for an inspection of the simple correlations among the independent variables. This however is not an adequate procedure, as a set of dummy variables may not have high pair-wise correlations among themselves, but yet form a perfectly collinear set. A good procedure then is to look at both the zero-order and partial correlation coefficients of the independent variables. When multicollinearity is present, the exclusion of any one of the independent variables from the regression equation does not decrease the amount of variance explained. The problem becomes one of knowing which variables to throw out. When is the degree of multicollinearity considered high enough to be unacceptable? According to one criterion** multicollinearity is regarded as high if at the 0.05 level of significance the value of the F statistic is significantly

* The Least Squares computation for $\hat{\beta}$ is usually expressed in matrix notation as $\hat{\beta} = (x'x)^{-1} x'y$. When a linear relation exists between the independent variables, the matrix $(x'x)$ is singular (determinant = 0) and has no inverse. Consequently when there is a high degree of multicollinearity, the determinant is very low or close to zero. For a more detailed explanation, see Johnston (1972), Kmenta (1971).

** Kmenta (1971), p. 390.

different from zero, but none of the t-statistics for the individual regression coefficients is. This situation implies that the individual influence of each of the independent variables is weak compared to their joint effect on the dependent variable.

When the data^{are} used for the regression analysis perfect multicollinearity is encountered for Italy and Japan. The simple correlation matrix for Italy reveals that status inconsistency and status mobility based on urban population are perfectly correlated with several other variables (variables based on steel production and military personnel). In the case of Japan, status inconsistency and status mobility based on urban population and status inconsistency based on military expenditure are perfectly correlated with each other and with total population. Consequently status inconsistency and status mobility based on urban population are excluded from the data for Italy and the status inconsistency and status mobility indices for urban population and military expenditure are omitted from the data for Japan.

Autocorrelation is usually associated with regression in time series. One of the standard assumptions in regression is that the error terms e_i and e_j associated with the i^{th} and j^{th} time period observations are not correlated. This means that when the observations are made over time the disturbance or error terms occurring at one time period does not affect the one associated with the next period. When this is not in fact true, then we have autocorrelation, sometimes also known as serial correlation. Autocorrelation may appear to be present when in fact a variable that should have been included

among the independent variables is omitted. If successive values of this variable are correlated the errors from the estimated model will appear to be correlated. The presence of autocorrelation is usually detected by computing the value of the Durbin-Watson statistic. This test is only valid for first order autocorrelation.* When the multiple regression procedure is first applied to the data, the value of the Durbin-Watson statistic indicates the presence of autocorrelation for 58 out of the 64 equations. Therefore the equations are refitted taking the autocorrelation into account. There are several methods available to do this. The one used here is due to Cochrane and Orcutt (1949). Very briefly this method operates in the following manner. The procedure first computes the estimates of the coefficients of the intercept and the independent variables (α and β) using ordinary least squares. The residuals are then calculated and from them an estimate of ρ (the coefficient of relation between the error terms) is obtained. The original equation is fitted using transformed variables. The original independent (x) and dependent (y) variables are transformed by multiplying the $t-1$ value of a variable by ρ and substituting this product for the t value.** The residuals of the refitted equation are then checked for autocorrelation. If there is no autocorrelation, the procedure is terminated; otherwise the iteration continues, using successive estimates of α and β .

* First order autocorrelation implies that $e_t = \rho e_{t-1} + u_t$; $|\rho| < 1$ where u_t is an independent error term, normally distributed with mean = 0 and constant variance. Second order correlation implies $e_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + u_t$ where $|\rho_1| + |\rho_2| < 1$; $E(u) = 0$

** $Y_t = \alpha + \beta X_t + u_t$
 $u_t = \rho u_{t-1} + e_t$
 $Y_t - \rho Y_{t-1} = \alpha(1 - \rho) + \beta(X_t - \rho X_{t-1}) + e_t$

Table 3.71

35a.

MULTIPLE REGRESSION .
INDEPENDENT VARIABLES: STATUS INCONSISTENCY
STATUS MOBILITY

France					
	Dep.	R ²	Durbin-Wat.	F	Sig.
No Lag	BD	0.497	1.88	1.58	NS
	NM	0.867	1.91	11.68	**
Lag 5 Years	BD5	0.335	.70	1.18	NS
	NM5	0.861	2.04	4.45	**
Lag 10 Years	BD10	0.587	1.82	3.16	*
	NM10	0.789	1.96	8.31	**
Lag 15 Years	BD15	0.557	1.91	2.65	*
	NM15	0.901	1.94	19.21	**
USSR					
	Dep.	R ²	Durbin-Wat.	F	Sig.
No Lag	BD	0.743	2.32	7.07	**
	NM	0.633	1.89	4.22	**
Lag 5 Years	BD5	0.626	2.41	3.91	**
	NM5	0.273	1.75	0.88	NS
Lag 10 Years	BD10	0.621	2.11	3.46	*
	NM10	0.501	1.80	2.12	NS
Lag 15 Years	BD15	0.845	2.45	10.90	**
	NM15	0.514	1.83	2.12	NS

*significant at .05 level

**significant at .01 level

NM = Nation-months

BD = Battle-deaths

Table 3.72

35b.

MULTIPLE REGRESSION
INDEPENDENT VARIABLES: STATUS INCONSISTENCY
STATUS MOBILITY

UK					
	Dep.	R ²	Durbin-Wat.	F	Sig.
No Lag	BD	.626	1.61	4.09	**
	NM	.798	2.29	9.66	**
Lag 5 Years	BD5	.472	1.62	2.09	NS
	NM5	.469	1.87	2.06	NS
Lag 10 Years	BD10	.622	1.82	3.66	**
	NM10	.694	1.99	5.04	**
Lag 15 Years	BD15	.605	2.23	3.23	*
	NM15	.319	2.04	0.99	NS
US					
	Dep.	R ²	Durbin-Wat.	F	Sig.
No Lag	BD	.890	1.98	8.98	**
	NM	.640	1.90	1.97	NS
Lag 5 Years	BD5	.750	1.63	3.00	NS
	NM5	.734	2.52	2.76	NS
Lag 10 Years	BD10	.664	2.27	1.76	NS
	NM10	.476	1.54	0.81	NS
Lag 15 Years	BD15	.793	2.01	2.98	NS
	NM15	.512	1.95	0.82	NS

*significant at .05 level

**significant at .01 level

NM = Nation-months

BD = Battle-deaths

Table 3.73

35c.

MULTIPLE REGRESSION
INDEPENDENT VARIABLES: STATUS INCONSISTENCY
STATUS MOBILITY

Germany

	Dep.	R ²	Durbin-Wat.	F	Sig.
No Lag	BD	.918	2.27	19.90	**
	NM	.866	2.28	11.49	**
Lag 5 Years	BD5	.879	1.98	12.10	**
	NM5	.863	2.08	10.50	**
Lag 10 Years	BD10	.876	2.40	10.99	**
	NM10	.839	2.33	8.11	**
Lag 15 Years	BD15	.935	2.07	20.78	**
	NM15	.931	1.97	19.48	**

Austria

	Dep.	R ²	Durbin-Wat.	F	Sig.
No Lag	BD	.915	2.13	16.14	**
	NM	.821	2.30	6.88	**
Lag 5 Years	BD5	.859	2.30	8.38	**
	NM5	.802	2.34	5.57	**
Lag 10 Years	BD10	.645	3.00	2.27	NS
	NM10	.612	3.01	1.97	NS
Lag 15 Years	BD15	.956	2.74	24.44	**
	NM15	.916	1.90	12.26	**

*significant at .05 level
**significant at .01 level

NM = Nation-months
BD = Battle-deaths

Table 3.74

35d.

MULTIPLE REGRESSION
INDEPENDENT VARIABLES: STATUS INCONSISTENCY
STATUS MOBILITY

Italy					
	Dep.	R ²	Durbin-Wat.	F	Sig.
No Lag	BD	0.788	2.24	4.78	**
	NM	0.854	2.35	7.52	**
Lag 5 Years	BD5	0.764	2.03	3.70	*
	NM5	0.726	2.13	3.03	NS
Lag 10 Years	BD10	0.954	3.30	20.74	**
	NM10	0.914	2.05	10.63	**
Lag 15 Years	BD15	0.813	2.36	3.72	NS
	NM15	0.926	2.92	10.72	**
Japan					
	Dep.	R ²	Durbin-Wat.	F	Sig.
No Lag	BD	0.926	2.04	18.77	**
	NM	0.927	2.76	19.05	**
Lag 5 Years	BD5	0.870	2.28	8.92	**
	NM5	0.911	2.45	13.65	**
Lag 10 Years	BD10	0.470	1.37	1.03	NS
	NM10	0.639	2.67	2.06	NS
Lag 15 Years	BD15	0.927	2.57	12.69	**
	NM15	0.960	2.77	24.00	**

*significant at .05 level

**significant at .01 level

NM = Nation-months

BD = Battle-deaths

3.7 The Regression Results

A regression is first performed using only the status inconsistency indices as independent variables. Subsequently both status inconsistency and status mobility indices are used as independent variables. The results of the second procedure are tabulated in Tables 3.71 to 3.74. The amount of variance explained for all the countries is fairly high and except for a few instances the R^2 s are statistically significant at the .05 level. The amount of variance explained ranges from a low of 27.3 percent to a high of over 80 percent. Both the dependent variables (Battle-Deaths and Nation-Months) perform equally well. When a time lag of 5 years is used, the amount of variance explained drops slightly. With a time lag of ten years the amount of variance explained tends to increase, but the R^2 s increase more with a 15 years time lag. This pattern is present in all the countries except for Britain and the U.S. When only status inconsistency indices are used as the independent variables the amount of variance explained is much lower and there is no evidence of any increase when time lags are introduced. (See Tables 3.75 - 3.79 in Appendix B.) The variance explained ranges from a low of 1.3 percent to a high of slightly over 70 percent.

3.8 An Assessment

All the results of the multiple regression should be viewed with great caution. In spite of refitting the equations to correct for autocorrelation, some of the Durbin-Watson values still do not conclusively indicate the absence of autocorrelation. This seems to point to the fact that the symptoms of autocorrelation are actually due to other causes. One possibility is that of the omission of a variable or variables from the set of

independent variables. It could also be due to the fact that the linearity assumption is not well founded. The possibility of this is partially supported by the graph of the fitted values plotted against the residuals. For almost all the countries (except Japan) there is a clear relationship between the fitted values ($\hat{Y}$) and the residuals ($\hat{e}$). There are also a large number of outliers among the residuals.

There is one other problem. The degree of multicollinearity is still high after excluding some variables. Table 3.8 displays the detailed statistics of one equation each for France and Japan. The R^2 for both equations is high; 0.867 for France and 0.927 for Japan. However the t values for the individual coefficients are very low. Further the standard error for some of the independent variables is excessively large. All these point to the fact that although all the independent variables together account for 86.7 percent and 92.7 percent of the variance, none of them on their own has any significant explanatory value. Most of the other equations have comparable results (a relatively high R^2 with low individual t values). Multicollinearity is still high enough to be of great concern.

Table 3.8

37a.

REGRESSION COEFFICIENTS AND STANDARD ERRORS

FRANCE

Dependent Variable	Independent Variable	Coefficient	Standard Error	t
NM	EXPEND	0.005	0.00	1.53
	POPUL	0.0007	0.00	1.01
	URBAN	-0.0003	0.00	-1.26
	STEEL	-0.0004	0.00	-.163
	MILITARY	0.001	0.00	8.24
	MOBEXP	25.77	21.55	1.19
	MOBPOP	274.90	252.21	1.08
	MOBURBAN	-224.94	230.19	-0.98
	MOBSTEEL	18.60	23.31	0.80
	MOBMIL	124.52	49.42	2.52
	CONSTANT	-93.74	84.36	-1.11

n=31 SE=21.80 $R^2=0.867$ D=1.91 F=11.68**

JAPAN

Dependent Variable	Independent Variable	Coefficient	Standard Error	t
NM	POPUL	.000	0.00	1.18
	STEEL	-.001	0.00	-3.54
	MILITARY	.007	0.00	0.27
	MOBEXP	-70.20	13.35	-5.26
	MOBPOP	-649.86	606.69	-1.07
	MOBSTEEL	96.66	30.94	3.12
	MOBMIL	-0.03	16.30	-0.01
	CONSTANT	10.78	13.48	0.80

n=15 SE=11.516 $R^2=0.927$ D=2.76 F=19.05**

*significant at .05 level

**significant at .01 level

NM = Nation-months of war involvement

BD = Total battle-deaths

EXPEND = Military expenditure

MILITARY = Military personnel

POPUL = Total population

STEEL = Iron/Steel production

URBAN = Urban population

MOBEXP = Status mobility in military expenditure

MOBPOP = Status mobility in total population

MOBURBAN = Status mobility in urban population

MOBMIL = Status mobility in military personnel

MOBSTEEL = Status mobility in iron/steel production

Table 3.9

MAJOR PATTERNS AND TRENDS OF RESULTS
(ORIGINAL & REPLICATION) CONTRASTED

	Wallace's Results		Replication Results	
	Relationship with War		Relationship with War	
Independent Variables	No Lag	Long Lag	No Lag	Long Lag
Status Inconsistency	Moderate to Strong	Strong	Moderate	Strong
Dimensions: Demographic Military Industrial	Strong Strong Weak	Strong Moderate Weak to Moderate	Moderate Strong Weak (Negative)	Strong Weak Strong
Status Mobility	Weak	Strong	Very Weak	Very Weak
Dimensions: Demographic Military Industrial	Weak (Negative) Moderate Weak	Strong Strong Strong	Weak (Negative) Weak (Negative) Weak (Negative)	Weak (Negative) Weak (Negative) Weak (Negative)

3.9 Conclusion

The results from the three statistical procedures used are not consistent. The results of the product moment parallel Wallace's results for status inconsistency. Even then, the increase of the product moment correlations with a 15 years time lag is not as spectacular as the one Wallace finds. (This may be attributed to the use of a different data set.) The results for status mobility are different from Wallace's (see Table 3.9). When a 15 years lag is used in the original study, the relationship between status mobility and war improves; whereas in the replication it still remains weak.

The bivariate analysis indicates that there is a relationship between status inconsistency and war, with the relationship becoming more pronounced after a lapse of fifteen years. The bivariate findings about the importance of individual indicators for status inconsistency also agree with Wallace's results. This augurs well for the first hypothesis linking status inconsistency and war. The same cannot be said for the second hypothesis on status mobility. The canonical correlation analysis does not add much to the bivariate findings except that as an index of war the frequency measure is not adequate. The pattern found in the bivariate analysis is suggested though not duplicated. Both the product moment and canonical correlation analysis indicate that indices of status inconsistency in the military dimension are related to war involvement. This fact together with the importance of the longer time lags, in both analyses, suggest the compatibility of the arms race model.

In retrospect, the canonical correlation results should also be viewed with great caution since there is evidence of multicollinearity in the

independent variables. The canonical weights of the variates are synonymous with the b-values of a regression equation, hence the unique contributions of individual variables to the canonical variates are indeterminate.

However the results of the regression analysis are more dubious. Although the multiple regression procedure finds a strong relationship between status inconsistency and status mobility and war involvement, there is no clear pattern of relationship. The high R^2 s coupled with the insignificance of the individual b values are symptoms of multicollinearity which implies that it is not possible to estimate the individual effects of each variable on war. Some of the values of the Durbin-Watson statistic do not conclusively indicate the absence of autocorrelation. This is disturbing, because a procedure for dealing with autocorrelation has already been used. The high degree of multicollinearity and the lingering symptom of autocorrelation make it very doubtful that much reliance can be placed on the results of the regression analysis. The product moment and canonical correlation results though encouraging do not constitute enough evidence to support the hypotheses. We have therefore not been able to duplicate or confirm Wallace's results. However it should be noted that his results also indicate the presence of autocorrelation in some equations. It is not possible to determine if multicollinearity is also a problem with his data, as the necessary statistics are not available in his tables. Nevertheless it would be imprudent to dismiss the theory as being devoid of merit in the absence of further research. More work needs to be done on it. Since there is an indication that at least one variable has been omitted from the set of independent variables, any further analysis should try to ameliorate this problem. The indication of probable mis-specification

suggests that a linear regression model may not be appropriate. A fruitful line of further research would be to refit the equations using a non-linear model. Another worthwhile avenue of future research would be to confront the problem of multicollinearity that seems to plague the model. If we ignore it or take the position that nothing much can be done with the problem, the inferences that can be drawn from the results will be of doubtful value. Hence a more determined effort should be made to first gauge the degree of multicollinearity, and then find ways to reduce its severity. A very often used rule of thumb is to constrain simple correlations between explanatory variables to be smaller than a certain predetermined number, say, $r = 0.8$ or 0.9 . The most obvious pair-wise interdependence among the independent variables can of course be avoided this way, but not much else. Farrar and Glauber (1967) and Haitovsky (1969) suggested using the determinant of the $(x'x)$ matrix. If all the independent variables are perfectly orthogonal then the determinant of $(x'x)$ is equal to 1 ($|x'x| = 1$). If they are perfectly related then $|x'x| = 0$. By gauging the position of the determinant on the continuum between 0 and 1 ($0 < |x'x| < 1$), the severity of the problem can be ascertained and from there the researcher can decide whether the problem is severe enough to warrant corrective action. By further looking at specific elements of the $(x'x)$ matrix, the problem can also be traced to specific variables.* Having gauged the extent and location of the problem, perhaps new information can be obtained, the offending variable(s) excluded or interdependent variables combined into a new index. Insight into the pattern of interdependence is necessary however

* See Farrar and Glauber - Multicollinearity in Regression Analysis: The Problem Revisited, The Review of Economics and Statistics, Vol. 49, 1967.

before effective action can be taken.. Finally a statistic indicating the degree of multicollinearity should be included in the summary tables so that the value of any inference drawn from the results can be clearly ascertained.

APPENDIX

Appendix A

Canonical Correlation:

Let X be a $k \times 1$ vector of k independent variables.

$$X = \begin{bmatrix} x_1 \\ . \\ . \\ . \\ x_r \end{bmatrix}$$

Let Y be an $m \times 1$ vector of m dependent variables.

$$Y = \begin{bmatrix} y_1 \\ y_2 \\ . \\ . \\ y_m \end{bmatrix}$$

$$\text{Let } U = \sum_{i=1}^k a_i x_i = a'x$$

where $a' = k \times 1$ vector of weights

$$\text{Let } W = \sum_{i=1}^m b_i y_i = b'Y$$

where $b' = m \times 1$ vector of weights

The canonical correlation is given by

$$\rho = \frac{\text{Cov}(a'x, b'Y)}{\sqrt{[\text{Var}(a'x) \text{Var}(b'Y)]}}$$

where the values of a' and b' are chosen to maximize the value of ρ .

APPENDIX B

Table 3.75

REGRESSION ANALYSIS
INDEPENDENT VARIABLE: STATUS INCONSISTENCY

Country	Time Lag in Years	Dependent Variable	R ²	Durbin- Watson	F	N
France	0	Battle-deaths	.267	1.73	2.37	31
		Nation-months	.802	2.03	27.43**	31
	5	BD	.252	1.61	2.12	30
		NM	.755	2.02	19.65**	30
	10	BD	.438	1.73	4.69**	29
		NM	.742	1.78	17.26**	29
	15	BD	.386	1.93	3.61*	28
		NM	.855	1.99	33.91**	28
USSR	0	Battle-deaths	.2164	2.18	1.80	31
		Nation-months	.166	1.78	1.29	31
	5	BD	.519	2.14	6.74**	30
		NM	.227	1.82	1.83	30
	10	BD	.447	1.98	4.85**	29
		NM	.206	1.76	1.55	29
	15	BD	.593	2.05	8.37**	28
		NM	.185	1.88	1.30	28
UK	0	Battle-deaths	.261	1.67	2.29	31
		Nation-months	.308	2.12	2.89*	31
	5	BD	.269	1.62	2.30	30
		NM	.329	2.05	3.06*	30
	10	BD	.423	1.81	4.40**	29
		NM	.052	1.95	0.33	29
	15	BD	.514	2.01	6.08**	28
		NM	.162	2.10	1.11	28

*significant at .05 level

**significant at .01 level

BD = Battle-deaths

NM = Nation-months

Table 3.76

REGRESSION ANALYSIS
INDEPENDENT VARIABLE: STATUS INCONSISTENCY

Country	Time Lag in Years	Dependent Variable	R ²	Durbin- Watson	F	N
US	0	Battle-deaths	.776	2.05	12.13**	19
		Nation-months	.523	1.81	3.83*	19
	5	BD	.527	2.31	3.62*	18
		NM	.201	1.79	0.83	18
	10	BD	.482	1.81	2.79	17
		NM	.281	1.77	1.17	17
	15	BD	.763	1.97	8.85**	16
		NM	.375	1.63	1.65	16
Germany	0	Battle-deaths	.868	2.08	32.88**	25
		Nation-months	.795	2.12	19.39**	25
	5	BD	.698	1.65	10.98**	24
		NM	.683	1.79	10.23**	26
	10	BD	.804	2.82	18.46**	23
		NM	.771	2.61	15.15**	23
	15	BD	.712	1.82	10.51**	22
		NM	.686	1.85	9.28**	22
Austria/ Hungary	0	Battle-deaths	.800	2.37	15.00**	20
		Nation-months	.673	2.09	7.72**	20
	5	BD	.349	2.17	1.876	19
		NM	.264	2.25	1.26	19
	10	BD	.697	2.24	7.48**	18
		NM	.696	2.46	7.44**	18
	15	BD	.277	2.24	1.15	17
		NM	.171	2.30	0.62	17

*significant at .05 level

**significant at .01 level

BD = Battle-deaths

NM = Nation-months

Table 3.77

REGRESSION ANALYSIS
INDEPENDENT VARIABLE: STATUS INCONSISTENCY

Country	Time Lag in Years	Dependent Variable	R ²	Durbin- Watson	F	N
Italy	0	Battle-deaths	.602	2.26	4.16*	16
		Nation-months	.814	2.35	12.28**	16
	5	BD	.723	1.90	6.53**	15
		NM	.666	1.98	4.99*	15
	10	BD	.864	1.78	14.29**	14
		NM	.777	1.84	7.84**	14
	15	BD	.955	1.56	42.40**	13
		NM	.799	1.94	8.94**	13
Japan	0	Battle-deaths	.672	2.56	5.12**	15
		Nation-months	.625	2.04	4.17*	15
	5	BD	.246	2.34	0.73	14
		NM	.169	1.91	0.46	14
	10	BD	.919	2.18	22.69**	13
		NM	.751	2.07	6.03**	13
	15	BD	.685	1.51	3.81*	12
		NM	.689	2.42	3.88*	12

*significant at .05 level

**significant at .01 level

BD = Battle-deaths

NM = Nation-months

Table 3.78

REGRESSION ANALYSIS
INDEPENDENT VARIABLE: STATUS MOBILITY

Country	Time Lag in Years	Dependent Variable	R ²	Durbin- Watson	F	N
France	0	Battle-deaths	.416	1.90	4.63**	31
		Nation-months	.377	1.75	3.93*	31
	5	BD	.315	1.65	2.87*	30
		NM	.406	1.60	4.27**	30
	10	BD	.516	1.74	6.40**	29
		NM	.579	2.20	8.25**	29
	15	BD	.368	1.55	3.35*	28
		NM	.633	1.58	9.92**	28
USSR	0	Battle-deaths	.626	1.76	10.88**	31
		Nation-months	.542	1.81	7.69**	31
	5	BD	.040	2.00	0.26	30
		NM	.178	1.76	1.35	30
	10	BD	.105	1.98	0.71	29
		NM	.417	1.76	4.29**	29
	15	BD	.385	1.97	3.60*	28
		NM	.458	1.87	4.86**	28
UK	0	Battle-deaths	.498	1.66	6.45**	31
		Nation-months	.666	1.93	12.96**	31
	5	BD	.385	1.68	3.91*	30
		NM	.625	1.91	0.16	30
	10	BD	.391	1.57	3.85*	29
		NM	.275	1.95	2.27	29
	15	BD	.215	1.75	1.57	28
		NM	.134	1.89	0.89	28

*significant at .05 level

**significant at .01 level

Table 3.79

REGRESSION ANALYSIS
INDEPENDENT VARIABLE: STATUS MOBILITY

Country	Time Lag in Years	Dependent Variable	R ²	Durbin- Watson	F	N
US	0	Battle-deaths	.760	1.94	11.08**	19
		Nation-months	.509	1.94	3.63*	19
	5	BD	.550	1.83	3.97*	18
		NM	.436	2.04	2.51	18
	10	BD	.174	1.95	0.63	17
		NM	.200	1.96	0.75	17
	15	BD	.292	1.90	1.13	16
		NM	.301	1.79	1.18	16
Prussia/ Germany	0	Battle-deaths	.361	1.66	2.82*	25
		Nation-months	.315	1.67	2.30	25
	5	BD	.635	2.13	8.26**	24
		NM	.599	2.14	7.10**	24
	10	BD	.471	1.77	4.01*	23
		NM	.448	1.76	3.65*	23
	15	BD	.531	1.39	4.81**	22
		NM	.536	1.32	4.91**	22
Austria/ Hungary	0	Battle-deaths	.186	1.22	0.86	20
		Nation-months	.256	1.20	1.29	20
	5	BD	.666	1.95	6.98**	19
		NM	.605	2.25	5.36**	19
	10	BD	.618	2.27	5.26**	18
		NM	.565	2.45	4.22*	18
	15	BD	.808	2.10	12.62**	17
		NM	.739	2.07	8.49**	17

*significant at .05 level

**significant at .01 level

Table 3.791

REGRESSION ANALYSIS
INDEPENDENT VARIABLE: STATUS MOBILITY

Country	Time Lag in Years	Dependent Variable	R ²	Durbin- Watson	F	N
Italy	0	Battle-deaths	.350	1.73	1.97	16
		Nation-months	.024	1.48	0.09	16
	5	BD	.414	1.83	2.35	15
		NM	.435	1.54	2.57	15
	10	BD	.532	1.76	3.41*	14
		NM	.368	1.51	1.75	14
	15	BD	.578	1.89	3.65*	13
		NM	.588	2.03	3.81*	13
Japan	0	Battle-deaths	.875	1.43	23.33**	15
		Nation-months	.773	1.41	11.35**	15
	5	BD	.777	2.04	10.45**	14
		NM	.745	1.95	8.76**	14
	10	BD	.415	1.19	1.89	13
		NM	.514	1.94	2.82	13
	15	BD	.348	2.08	1.25	12
		NM	.480	2.36	2.15	12

*significant at .05 level

**significant at .01 level

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