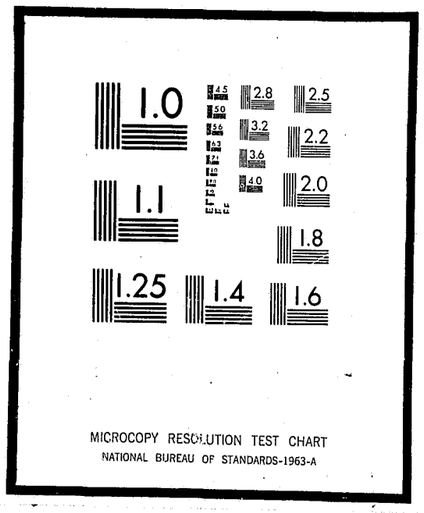
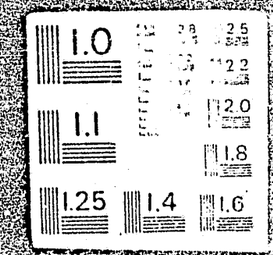
NCJRS



U.S. DEPARTMENT OF JUSTICE
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
NATIONAL CRIMINAL JUSTICE REFERENCE SERVICE
WASHINGTON, D.C. 20531

Date filmed 1/28/76



PREDICTION OF POLICE INCIDENTS AND ACCIDENTS BY METEOROLOGICAL VARIABLES

DONALD P. WILL, JR. AND S. B. SELLS

Contract No. Nonr 3436(00)
Dimensions of Stimulus Situations
Which Account for Behavior Variance

Group Psychology Branch
Office of Naval Research
Technical Report No. 14

TEXAS CHRISTIAN UNIVERSITY
INSTITUTE OF BEHAVIORAL RESEARCH

March, 1969

Dimensions of Stimulus Situations
Which Account for Behavior Variance
Contract No. Nonr 3436(00)
Group Psychology Branch
Office of Naval Research

Technical Report No. 14
March, 1969

PREDICTION OF POLICE INCIDENTS AND ACCIDENTS

BY METEOROLOGICAL VARIABLES

DONALD P. WILL, JR. AND S. B. SELLS
Institute of Behavioral Research
Texas Christian University

Distribution of this document is unlimited.
Reproduction in whole or in part is permitted
for any purpose of the United States Government.

PREDICTION OF POLICE INCIDENTS AND ACCIDENTS BY METEOROLOGICAL VARIABLES

This study is part of a broad and diversified research program concerned with the identification and analysis of environmental variables that account for behavior variance. An outline of the scope of environmental variables embraced in the program conception was presented by Sells (1961, 1963) and includes aspects of the physical environment as well as cultural and social stimulus situations. Except in the context of environmental stress and related specific problems of comfort and performance, however, variables representing the physical environment have been largely ignored in psychological research. This is believed to reflect mainly the greater importance attributed to the social environment in the explication of behavior. Not withstanding the apparent need to expand behavioral research to include the physical environment, it may be noted that research relating effects of aspects of the physical environment to behavior is not readily amenable to laboratory methods and involves logistic problems that may often deter investigative effort. The present study, involving a set of physical environment variables, representing periodic meteorological fluctuations, demonstrates one possible way of overcoming these problems.

An earlier study, by Findikyan and Sells (1964) attempted to relate day-to-day fluctuations in subjective feelings of 42 college students, on 37 occasions over a four-month period, February through May, 1963, with twelve weather variables representing the 8:00 A.M. readings at the Fort Worth weather station at the Greater Southwest International Airport.

Although the sample of students and occasions was small, and the measurement of subjective feelings, by a check-list of 40 items, was crude, a significant correlation was found, in the female subsample, for temperature variations. The present investigation, involving hourly variations in incidents handled by the police department radio dispatcher in the City of Fort Worth from 5 January through 30 June 1964, as the dependent variables, and simultaneous weather observations at the Fort Worth weather station, as independent variables, was undertaken on the basis of considerations mentioned in the earlier report.

Findikyan and Sells (1964) presented a brief review of literature on biological and behavioral studies involving weather variables. Following Muecher and Ungeheuer (1961), two types of weather conditions were differentiated that could influence psychophysiological functions of organisms. These are (a) periodic changes, such as diurnal, seasonal, and annual variations in weather, brought about mainly by solar radiation, and (b) aperiodic changes (advective fluctuations), such as abrupt air mass movements. They advanced a hypothesis that stress reactions may be generated by conditions involving conflict between advective weather events and local rhythmic changes. This is illustrated by "Fohn" weather, consisting of dry warm southerly winds in the Alpine regions of Europe, accompanied by sharp rise in temperature, reduced pressure and reduced humidity. The "Chinook" and the "Santa Anna" wind conditions reported in the Rocky Mountain areas of the United States are similar.

Etholgists have investigated relationships of periodicities in meteorologic and geophysical phenomena to cyclic behavior in a number of animal species, using temperature, illumination, barometric changes, tidal rhythms, cosmic showers, magnetic storms, and other variables in relation to a variety of biologic functions. Human studies, apart from those involving stress and performance deterioration effects, have been few and unsystematic. Observations of advective phenomena, such as Fohn weather, which have been reported to affect birth and death rates, car accidents, and many psychophysiological symptoms, including cardiovascular illness, are restricted to certain geographic areas and involve extreme conditions, in most cases. Periodic weather fluctuations, which may be expected to have wider implications, have rarely been studied scientifically in relation to significant behavioral phenomena.

With the advantages and limitations discussed below, the present study is in one respect a demonstration of a paradigm that may have wide application in studies of effects of environmental fluctuations on behavior. The dependent variables employed consist of frequencies of various categories of police calls handled by the radio dispatcher and made available from records of the Fort Worth Police Department. These variables, reflecting disturbances, accidents, and criminal acts requiring police intervention, are collateral indicators of behavior in a city, not measures of individual behavior.

Both the weather fluctuations employed as predictors (independent variables) and the dependent, police variables have advantages of reliability

and validity in comparison with data that require measurement of individual behaviors, such as the mood subjective checklist used by Findikyan and Sells (1964). Police dispatcher call summaries are objective records of behavioral events, while the hourly weather reports are physical measures collected routinely by the Weather Bureau, according to highly standardized procedures. In addition, the police calls reflect behavior problems of relevance to community living that are replicated many times every hour of every day among large numbers of persons. If meaningful relations to weather changes can be expected of such behaviors, they should be more reliably predicted as collateral indices than by individual measurement.

On the other hand, significant correlations of weather variations with collateral indices such as police calls do not necessarily reflect similar relations with individual behavior. The organization of behavior reflected in the police calls involves mainly the institutional characteristics of life in the city, which tend to mask the important variations attributable to individual differences. Further, the individual behaviors that relate to those involved in the various collateral police call indices are in most cases neither capable of being specified nor necessarily homogeneous. Nevertheless, the discovery of relationships between weather and behavioral indices in the present setting is sociologically interesting and may suggest hypotheses of psychological significance.

The present study covers only a six-month period, January through June, 1964, and is based on data for only one city, located in north central Texas. The weather sample represents winter and spring conditions in one

year in an area where winters are moderate, compared to other sections. Generalization based on relationships obtained in this study are generally contraindicated and perhaps the principal value of the results may be to demonstrate a model for further investigation.

METHOD

Source Data

The independent variables consisted of 13 weather measures, recorded on an hourly basis at the Fort Worth weather station located at the Greater Southwest International Airport, plus a fourteenth variable designating the number of the day in the six-month period covered by the study. The dependent variables included 26 categories of police incidents, reported on an hourly basis in terms of frequencies of calls handled by the radio dispatcher of the Fort Worth Police Department, plus five composite variables computed by combination of various categories. The period covered by both sets of data was 178 days from 5 January 1964, through 30 June 1964.

The weather data were obtained from the Weather Bureau National Records Center at Asheville, North Carolina, on punched cards. The police data were provided, also in punched card form, by the Fort Worth Police Department. The police data were received on 90-column cards and had to be transferred to 80-column cards prior to analysis. The Fort Worth Police Department shifted subsequently to 80-column equipment.

Independent Variables

The 13 weather measures and day number were as follows:

1. Visibility
2. Sea level pressure
3. Dew point temperature
4. Wind speed
5. Station pressure
6. Dry bulb temperature
7. Wet bulb temperature
8. Relative humidity
9. Total sky cover
10. Precipitation (number of hours with some precipitation)
11. Fog (number of hours with some fog)
12. Precipitation (dichotomous, six hour)
13. Fog (dichotomous, six hour)
14. Day number

For variables 1-9, quantitative measures were used which in each case represented averages of three observations taken on the hour, twenty minutes before the hour, and twenty minutes after the hour. Qualitative data on precipitation and fog were used to score precipitation and fog dichotomously in terms of presence in any amount vs. absence, for each hour. After the decision was made, on the basis of analysis of the police data, to group all data in six-hour intervals, the precipitation and fog variables were combined over six-hour periods in two ways. Variables 10 and 11 were computed by summing the hourly dichotomous codings of these variables over the six-hour period. Variables 12 and 13 were scored

dichotomously for presence vs. absence over the entire six-hour period. It was originally thought that variables 10 and 11 might be mostly bimodally distributed, into high or low values, with extremely non-normal distributions. After coding, it was determined that these distributions were skewed, as were those of other variables, but that there was no tendency toward dichotomy. Nevertheless, the dichotomous scores for precipitation and fog were retained for inclusion in the subsequent analyses.

Variable 14, Day number, is expected to be correlated with temperature for the period of the study inasmuch as the weather becomes progressively warmer from January through June. This is not a random variable, but rather an indicator of seasonal change.

Dependent Variables

The 31 police variables included in the study (variables 15 through 45) were as follows:

15. Accidents, minor
16. Accidents, major
17. Assault
18. Assault, criminal
19. Cutting
20. Demented person
21. Disturbance
22. Disturbance, domestic
23. Dog bite victim

24. Dog, mad
25. Drunk
26. Drunk (down)
27. Drunk (in car)
28. Drunk (DWI)
29. Fight
30. Fight, gang
31. Fire call
32. Parking violation
33. Person with gun
34. Prowler
35. Robbery
36. Shooting
37. Suspect person
38. Malicious mischief
39. Stolen car
40. Assist
41. Accidents combined (15 + 16)
42. Assault combined (17 + 18) (not used because of a computational error)
43. Drunks combined (25 - 28, incl.)
44. Composite, all variables except 40, Assist)
45. Composite, all variables

Examination of the police data indicated that hourly frequencies of most categories were too low to support a productive analysis. Combination of hourly frequencies over six-hour periods appeared necessary to bring frequencies of all police variables to a level at which correlational analysis would be reasonable. Accordingly, four quarter-day periods, I. midnight to six A.M., II. six A.M. to noon, III. noon to six P.M., and IV. six P.M. to midnight, were adopted. The 31 police variables were converted to these four quarters for each day by summing frequencies across each six-hour period. The weather variables for the corresponding quarters were averaged across the six hours, with the exception of variables 10, 11, 12, and 13, which, as described earlier, were based on hourly dichotomies.

Analysis

The coding of the data was performed on an IBM 1620 computer. Matrices of intercorrelations among all 45 variables were computed on the same machine, using extended precision to ensure accuracy. Correlations were computed separately for each of the four quarter-day (six-hour) periods of the day, over 178 days. A fifth matrix of correlations over all 712 quarter-day periods was also computed.

After examination of the correlations, it was decided to limit further analyses primarily to nine police variables which appeared to be most promising for use as criterion variables. These nine variables are: (17) Assault, (20) Demented person, (21) Disturbance, (22) Domestic disturbance, (29) Fight, (31) Fire call, (40) Assist, (41) Accidents (combination of major

and minor), and (43) Drunks (combination of four categories). Using all thirteen weather variables and day of the year as predictors, and each of the nine selected police variables, in turn, as criterion, approximations to the multiple correlations were obtained by the Criterion Factorization Method (Demaree, 1967; Demaree & Willis, 1969). These analyses were carried out separately for each of the four quarters and for total days.

Inasmuch as the Criterion Factorization (Crifac) Method is not yet well known, it will be described briefly here. The Crifac Method separates the criterion variable into a number of factors or components. The factors are defined by the predictor variables but so oriented that the criterion variable will take a positive loading on each factor. The communality of the criterion approximates the squared multiple correlation. This approximation is mathematically exact if the number of factors extracted is equal to the number of criterion variables. If fewer factors are extracted, the multiple correlation tends to be underestimated somewhat. In practice, it has been found that no more than half a dozen factors are usually sufficient to produce an approximation to the multiple correlation which is accurate to three or four decimal places. Since a criterion variable normally is considered relatively "pure," that is, composed of a small number of components which account for all of the stable predictable variance, it should not be surprising that only a few components are necessary to approximate the multiple correlation. The extra factors that might be extracted may reasonably be considered to represent error. Hence, the approximate regression weights produced by the Crifac Method should prove to be more stable than exactly-computed weights.

The factors generated by the Crifac Method are also of considerable usefulness in interpreting the sources of variation in the criterion that are common to the predictors. The composition of the factors is, however, rather susceptible to sampling variations, so that it has been found sometimes advantageous to perform a rotation of the factors. In the present analysis, all factor matrices were rotated by the Varimax Method, followed by extension of the rotated factors to the criterion variable. Some previously undiscovered problems of rotation are discussed subsequently.

RESULTS

The matrices of correlations among all variables for each of the four quarters of the day and for the total across all quarters are presented in tables 1 through 5 respectively. Considering the intercorrelations among weather (predictor) variables, it is obvious that there is a considerable amount of redundancy. Variables 3, 6, and 7 (three measures of temperature) are highly intercorrelated in all time periods. To a lesser extent, they are also substantially correlated with variable 14, the day of the six-month period. Similarly, the two measures of atmospheric pressure, variables 2 and 5, are very highly intercorrelated in all time periods. There are also substantial correlations between the two measures of precipitation, variables 10 and 12, and among variables 1 (Visibility), 11 and 13 (two measures of fog). Surprisingly, though, variable 8 (Total sky cover) is not substantially correlated with precipitation, as was (perhaps naively) expected.

List of Variables for Tables 1 - 5

Number	Name
1	Visibility
2	Sea level pressure
3	Dew point temperature
4	Wind speed
5	Station pressure
6	Dry bulb temperature
7	Wet bulb temperature
8	Relative humidity
9	Total sky cover
10	Precipitation, no. hours with some
11	Fog, no. hours with some
12	Precipitation, dichotomous (some/none)
13	Fog, dichotomous (some/none)
14	Day of six-month period
15	Accident, minor
16	Accident, major
17	Assault
18	Assault, criminal
19	Cutting
20	Demented person
21	Disturbance
22	Disturbance, domestic
23	Dog bite victim
24	Dog, mad
25	Drunk
26	Drunk, down
27	Drunk, in car
28	Drunk, driving while intoxicated
29	Fight
30	Fight, gang
31	Fire call
32	Parking violation
33	Person with gun
34	Prowler
35	Robbery
36	Shooting
37	Suspicious person
38	Malicious mischief
39	Stolen car
40	Assist
41	Accident combined (major + minor
42*	Assault combined (simple + criminal)
43	Drunk combined (sum of 4 categories)
44	Total of all categories, except assist
45	Total of all categories

*Due to a computational error at an early stage in the analysis, Variable 42 (Assault combined) was incorrectly computed. Variable 42 was disregarded in all further analysis.

TABLE 1
Correlations Among Variables for the First Quarter of the Day

Var.														
1														
2	11													
3	-02	-55												
4	05	-44	26											
5	12	100	-51	-44										
6	09	-50	97	29	-45									
7	04	-52	99	28	-48	99								
8	-43	-42	53	01	-42	32	42							
9	-30	-38	34	43	-38	29	32	35						
10	-48	-18	09	17	-18	02	05	31	44					
11	-91	-05	-02	-10	-06	-11	-07	35	21	32				
12	-50	-20	15	16	-20	07	11	35	51	85	39			
13	-86	-08	01	-11	-09	-09	-04	39	20	36	85	37		
14	-20	-22	80	04	-18	84	82	21	-01	-04	-20	00	-18	
15	-04	-22	20	01	-22	14	17	32	17	18	01	22	04	10
16	12	-08	07	10	-08	08	08	00	02	08	-12	09	-13	04
17	02	-13	14	12	-12	14	14	10	09	08	-03	03	-04	10
18	08	-09	05	21	-09	05	05	01	02	-02	-08	-05	-10	-01
19	12	-10	16	11	-10	16	16	03	01	-09	-07	-07	-07	13
20	09	-12	12	06	-11	12	12	04	00	-13	-05	-15	-04	13
21	14	-13	28	04	-11	29	29	10	08	-07	-11	04	-12	26
22	11	-05	23	13	-04	23	23	10	11	-04	-12	03	-11	17
23	03	-04	07	07	-04	07	07	04	10	17	-02	18	-02	03
24	00	00	00	00	00	00	00	00	00	00	00	00	00	00
25	07	-06	06	03	-06	07	07	01	06	11	-04	09	-04	-01
26	03	-01	19	-04	00	21	21	01	-09	-06	-02	-07	-05	21
27	07	-06	14	02	-05	14	15	03	09	-09	-06	-03	-04	05
28	-03	07	-10	-02	07	-12	-11	03	-04	-05	05	-07	03	-13
29	16	-01	12	05	-01	11	11	10	04	-09	-13	-02	-14	09
30	07	-07	07	05	-06	08	08	00	-02	-07	-03	-01	-07	03
31	-10	05	-15	-05	04	-18	-17	02	-06	20	10	09	12	-16
32	-08	03	-09	-08	02	-11	-10	02	05	-01	13	05	13	-13
33	-05	04	-07	-09	03	-08	-07	-01	00	-04	05	02	15	-09
34	11	-16	16	14	-16	17	17	04	00	-17	-13	-13	-13	17
35	09	00	12	06	01	12	12	02	-03	-11	-07	-07	-04	13
36	09	-01	05	08	-01	07	06	-08	02	-10	-09	-09	-12	01
37	-01	-03	04	00	-03	06	05	-05	01	-07	03	-05	06	00
38	16	-16	23	05	-15	25	24	05	03	-16	-10	-07	-14	11
39	07	-11	10	09	-11	12	11	-03	01	-04	-01	00	-07	06
40	18	-21	47	09	-19	47	48	20	15	-10	-18	02	-19	44
41	01	-20	19	04	-20	14	17	26	15	18	-04	21	-02	09
42	11	-11	11	12	-11	11	11	02	04	10	-12	09	-13	07
43	08	-06	14	01	-05	14	15	03	04	02	-04	02	-06	05
44	13	-18	27	12	-17	26	27	14	10	-03	-12	04	-13	17
45	17	-20	38	10	-18	38	39	18	12	-06	-15	04	-16	32

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

TABLE 1 CONTINUED

Var.															
17	18														
18	20	15													
19	15	06	11												
20	24	01	-08	21											
21	46	10	06	35	20										
22	28	21	14	25	06	37									
23	08	-03	-03	-03	-03	-07	-09								
24	00	00	00	00	00	00	00	00							
25	27	16	20	16	01	25	22	04	00						
26	08	-03	07	32	00	16	10	-03	00	03					
27	14	20	01	02	13	30	20	-04	00	14	-08				
28	11	03	12	05	07	18	11	-03	00	13	05	14			
29	38	09	06	18	18	43	42	-05	00	13	12	18	25		
30	47	12	29	25	02	38	20	-03	00	31	19	07	25	31	
31	17	-09	00	-08	01	-05	04	04	00	-05	10	-11	01	05	-05
32	-02	-09	-08	05	-04	05	-06	21	00	01	01	-01	-02	10	-04
33	16	01	02	06	05	09	08	-03	00	29	12	09	14	08	12
34	22	-02	14	06	15	27	20	-08	00	12	10	03	04	18	23
35	19	-07	03	26	21	23	17	-03	00	10	12	-03	03	22	11
36	24	05	16	25	18	26	20	-04	00	13	22	11	13	28	30
37	05	-03	-13	02	-03	04	-09	-04	00	03	-08	00	06	08	03
38	26	05	09	14	-01	43	21	-05	00	24	19	17	09	32	29
39	08	08	-06	13	09	15	31	03	00	23	12	02	-05	20	09
40	35	27	23	35	15	65	62	-10	00	27	27	35	15	49	38
41	67	30	13	20	17	58	40	07	00	35	14	19	23	45	47
42	96	45	22	15	22	44	31	07	00	29	06	19	11	37	46
43	31	19	20	25	07	38	29	00	00	85	35	44	40	25	38
44	58	20	18	40	22	76	60	-02	00	46	27	30	28	57	54
45	53	27	22	39	21	77	66	-06	00	41	28	34	23	60	50

Var.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
32	20														
33	-03	-01													
34	-02	-02	01												
35	00	02	19	21											
36	-03	-01	17	11	03										
37	-10	04	20	-04	02	-02									
38	-10	-05	13	19	11	22	11								
39	03	02	15	19	15	09	-03	22							
40	-06	-03	18	30	20	28	07	41	26						
41	18	10	21	27	26	25	-02	35	21	56					
42	13	-05	15	19	15	23	04	25	09	39	69				
43	-04	00	32	14	12	24	01	33	21	45	43	33			
44	05	05	25	45	32	38	05	48	41	74	79	59	60		
45	04	03	24	40	30	36	05	49	37	92	75	55	58	92	

Var.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45

TABLE 2
Correlations Among Variables for Second Quarter of the Day

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1															
2	19														
3	-30	-49													
4	14	-32	08												
5	18	100	-45	-32											
6	-12	-39	95	08	-34										
7	-23	-45	99	09	-40	99									
8	-64	-47	47	-01	-47	18	34								
9	-45	-35	40	26	-35	25	34	56							
10	-62	-15	19	-02	-14	04	13	54	44						
11	-81	-14	26	-08	-14	12	20	51	34	59					
12	-56	-29	27	-01	-29	09	19	62	52	79	51				
13	-83	-15	26	-12	-14	12	20	54	35	60	91	48			
14	00	-20	81	02	-15	89	85	03	10	-03	01	03	-01		
15	-28	-07	03	-03	-07	-05	00	27	17	47	24	32	31	-07	
16	-20	-13	06	-13	-14	02	04	18	09	23	20	16	27	-03	39
17	-15	07	08	05	07	07	08	06	09	06	01	04	09	07	05
18	-07	-03	08	03	-03	07	08	04	09	10	00	07	02	05	01
19	-05	-04	06	05	-03	04	05	08	06	22	09	17	04	00	20
20	13	12	-06	-09	12	-01	-04	-17	-18	-10	-10	-11	-09	-04	-03
21	04	03	19	-06	04	23	21	-04	-11	-10	-09	-08	-03	25	-05
22	02	-05	01	00	-05	-02	-01	07	-02	-04	00	-03	-04	-01	-14
23	-19	01	07	-07	01	06	06	06	-03	02	09	-05	13	07	00
24	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
25	03	-11	18	-08	-10	19	18	04	02	03	-01	06	-06	21	-05
26	-06	-08	09	00	-08	07	08	11	-01	07	03	08	04	06	10
27	-07	-08	09	02	-08	06	08	13	13	01	04	16	00	10	-05
28	00	03	00	-02	03	-01	00	03	-03	-04	-04	-06	-05	00	-07
29	08	-02	18	07	-01	21	20	-03	00	-05	-04	-05	-05	16	-13
30	02	05	-03	-08	05	-02	-02	-05	-06	-04	-04	-06	-05	01	-02
31	-08	18	-25	-11	17	-27	-26	-02	-07	09	00	01	07	-20	15
32	08	-03	07	-12	-03	06	07	06	-05	-04	00	-02	-01	11	16
33	-05	-11	09	-09	-11	07	09	08	14	-01	-04	02	-01	00	-07
34	-13	-02	06	-04	-02	00	03	18	15	03	12	00	11	-09	-03
35	-08	-06	-07	06	-06	-12	-09	12	04	10	12	09	16	-14	12
36	01	03	14	04	04	16	15	-02	-04	-01	-03	00	01	20	08
37	00	01	00	01	01	01	00	-04	-04	09	06	-05	05	-02	07
38	07	-12	14	18	-11	18	17	-07	02	-09	-05	02	-06	17	07
39	-02	05	01	15	05	04	03	-07	05	-08	-01	-03	01	00	-08
40	-02	-11	34	-11	-10	38	36	03	-04	00	04	01	07	40	-02
41	-29	-09	04	-05	-09	-04	01	28	17	47	26	32	33	-07	99
42	-22	-12	08	-12	-12	03	06	18	10	23	20	16	28	-02	39
43	-03	-15	21	-06	-14	20	21	12	05	05	02	13	-04	22	-02
44	-18	-08	10	-02	-08	06	09	19	08	28	16	19	21	03	77
45	-19	-13	24	-05	-12	20	23	21	10	29	18	22	24	10	69

TABLE 2 CONTINUED

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
17	04														
18	-08	36													
19	-04	-04	-03												
20	04	05	08	-03											
21	-02	21	03	07	07										
22	-15	04	06	00	00	14									
23	-03	27	-04	-04	03	12	05								
24	00	00	00	00	00	00	00	00							
25	-02	01	-05	06	10	04	04	14	00						
26	26	09	-07	-03	15	-02	03	02	00	-03					
27	-01	15	11	-06	-12	01	12	-08	00	10	-01				
28	-02	-02	-02	-02	-05	-03	-04	23	00	21	-05	-04			
29	-06	-05	00	07	03	09	20	-03	00	09	02	-06	07		
30	03	-02	-02	-02	07	32	09	-02	00	-02	06	10	-01	07	
31	-02	11	00	-06	-03	-07	-06	11	00	-05	04	-04	-03	-05	-03
32	18	00	00	-14	07	-03	-14	-01	00	07	05	-05	01	-09	-07
33	04	-01	04	19	07	06	-05	-07	00	14	18	-12	-04	00	-04
34	09	-05	-04	-04	01	-08	-04	07	00	06	01	05	-02	01	-02
35	03	05	04	00	07	-01	-05	-07	00	-17	15	00	-04	06	-04
36	10	07	05	22	14	17	-04	02	00	04	12	-07	-03	17	-03
37	08	05	00	-08	-14	-06	00	03	00	-09	-06	-06	-05	-14	-05
38	11	10	04	07	07	11	07	00	00	14	15	02	07	26	21
39	-03	11	-01	-02	10	-01	07	01	00	09	-02	08	06	-12	-14
40	06	13	12	12	17	43	37	02	00	24	09	04	01	21	04
41	54	06	-01	17	-02	-05	-15	-01	00	-04	14	-05	-07	-13	-02
42	98	24	00	-05	05	02	-13	02	00	-02	28	02	-02	-07	02
43	09	09	-03	01	10	03	08	11	00	84	39	42	23	06	04
44	49	19	00	14	12	11	05	04	00	14	28	00	-01	03	05
45	43	21	08	20	16	28	18	07	00	22	23	04	-01	09	07

Var.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
32	00														
33	05	-08													
34	-03	-05	00												
35	00	-03	-11	00											
36	-04	08	09	-07	14										
37	03	09	-08	-11	-08	-11									
38	-05	-01	12	-09	04	17	-03								
39	03	07	09	-09	02	06	02	25							
40	-09	14	17	00	-10	22	-06	22	21						
41	14	18	-06	-01	12	09	08	08	-08	-01					
42	00	18	04	08	04	11	09	12	00	08	53				
43	-04	06	14	06	-08	05	-13	19	10	25	00	11			
44	14	30	07	-01	12	18	10	42	21	25	79	51	23		
45	10	31	10	-04	08	27	04	44	27	58	71	46	29	89	

Var.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45

TABLE 3
Correlations Among Variables for Third Quarter of the Day

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1															
2	09														
3	-13	-49													
4	14	-31	-03												
5	09	100	-46	-32											
6	22	-33	82	-06	-29										
7	03	-43	96	-04	-39	95									
8	-65	-36	50	01	-36	-07	25								
9	-42	-20	35	08	-20	-06	17	70							
10	-81	-10	15	-13	-11	-22	-02	68	48						
11	-84	-07	12	-15	-07	-17	-01	55	32	76					
12	-63	-14	27	-08	-14	-11	11	69	56	84	54				
13	-83	-08	15	-13	-09	-17	00	59	35	66	88	54			
14	17	-18	78	-15	-14	86	85	06	03	-10	-14	01	-14		
15	-40	04	13	-11	04	-09	03	38	24	50	33	42	27	00	
16	-21	02	07	-05	02	-03	03	20	09	32	22	29	15	-02	40
17	09	12	-05	05	12	01	-03	-12	-19	-10	-07	-12	-08	03	-03
18	07	06	-06	01	06	-01	-03	-08	-06	-02	-04	06	-05	01	08
19	01	03	00	-10	03	02	01	-03	04	-07	-03	-06	-01	08	-03
20	-04	01	02	-08	01	-04	-01	09	05	04	10	02	11	-04	-06
21	07	-10	10	-06	-10	12	12	-01	-02	-08	-06	-04	-05	04	02
22	-02	-09	06	05	-09	05	05	03	-03	-02	00	-02	-01	-01	-06
23	07	-04	-02	-01	-04	01	00	-05	-06	-10	-08	-09	-06	-03	-09
24	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
25	-11	-15	14	06	-14	05	10	16	18	04	05	08	09	04	-01
26	-07	-08	02	06	-08	-02	00	08	11	11	06	09	06	-05	04
27	-13	-15	07	06	-15	-04	03	18	12	02	11	04	16	-12	03
28	-04	01	03	03	01	01	03	05	09	09	01	17	-02	03	26
29	-20	02	04	-19	02	-01	02	09	07	17	29	10	24	-03	13
30	-01	07	11	-12	07	09	11	07	05	05	04	06	-01	11	00
31	01	17	-19	11	17	-12	-16	-15	-09	-03	-06	-04	-08	-18	02
32	-16	01	-05	-06	00	-10	-07	09	02	12	09	10	13	-08	06
33	-01	08	02	-05	09	-01	01	06	08	08	08	04	04	06	09
34	-01	08	-08	-02	08	-02	-05	-11	-07	-06	-04	-05	-01	-01	-06
35	06	00	07	-02	01	07	07	-01	05	-07	-08	-01	-05	05	07
36	-01	09	05	-08	09	06	06	-01	-03	-02	02	03	-01	07	11
37	12	-03	-02	-01	-03	04	01	-09	-03	-11	-14	-07	-16	-05	06
38	-01	-02	-12	-02	-03	-12	-12	-03	-04	-04	-05	01	00	-15	02
39	-07	12	-08	-16	11	-10	-09	03	-03	14	10	12	05	-09	06
40	07	-14	31	-03	-15	33	34	03	00	-08	-06	-01	-05	30	-02
41	-40	03	13	-11	04	-08	03	38	24	52	34	44	28	00	98
42	-19	04	06	-04	04	-03	02	17	06	30	20	27	13	-01	38
43	-16	-19	15	10	-19	02	10	22	24	10	09	14	14	-02	06
44	-36	00	14	-14	00	-05	06	34	20	43	29	38	25	-01	86
45	-32	-04	21	-12	-03	04	14	33	19	38	26	36	22	06	75

TABLE 3 CONTINUED

Var.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
17	01														
18	-01	-04													
19	-15	-05	-06												
20	-10	-06	-03	-04											
21	08	-02	-07	06	02										
22	12	-03	03	-04	-04	22									
23	-04	-05	-0.	03	02	09	10								
24	00	00	00	00	00	00	00	00							
25	01	-06	01	01	-04	16	33	-10	00						
26	08	-07	-03	-04	11	-07	03	04	00	02					
27	05	-01	02	01	02	22	08	-04	00	03	-06				
28	29	04	05	-12	-07	02	09	00	00	10	-03	04			
29	07	-06	-06	-01	-02	03	01	04	00	-02	-02	07	01		
30	09	03	09	-06	04	03	10	-06	00	04	15	-02	-06	07	
31	01	-02	00	-03	-07	00	00	07	00	-10	03	10	-02	-07	-08
32	13	06	-13	-06	03	-11	-10	03	00	-09	04	-08	10	-04	-02
33	05	-06	-09	-02	09	13	-01	-01	00	03	08	02	09	-05	-06
34	15	14	13	-09	02	-01	-03	11	00	-05	02	-01	-07	01	15
35	-03	-05	09	-14	11	05	-05	04	00	05	-03	03	00	-11	-01
36	06	08	19	11	-02	06	00	-01	00	13	-04	-03	07	03	-01
37	02	00	19	-05	00	-11	-01	-04	00	15	04	-05	05	-04	02
38	-04	01	13	00	-09	22	18	-01	00	16	-06	06	13	05	03
39	-02	-13	24	06	00	03	12	-02	00	07	02	00	02	13	03
40	12	-01	-07	12	11	42	50	11	00	21	-08	10	04	05	07
41	55	-03	07	-06	-07	03	-03	-09	00	-01	06	04	29	13	02
42	99	18	-01	-16	-10	07	11	-04	00	00	07	04	29	06	09
43	09	-08	01	-02	01	16	32	-07	00	86	45	25	21	-01	08
44	52	-04	14	-03	-03	23	24	01	00	21	12	15	33	16	11
45	50	-04	07	01	01	38	38	02	00	27	08	14	30	18	02

Var.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
32	-12														
33	03	08													
34	04	-05	-06												
35	-05	03	06	-08											
36	-03	-04	-04	28	-06										
37	-05	07	-16	09	07	15									
38	04	-01	08	00	-04	10	06								
39	-05	-06	13	06	06	22	-01	02							
40	-04	-01	21	05	07	06	-05	08	15						
41	02	08	09	-02	06	11	06	02	05	00					
42	00	14	04	17	-03	08	02	-03	-04	12	54				
43	-05	-06	07	-05	04	07	14	13	07	16	07	08			
44	06	08	18	03	09	19	11	21	18	22	88	50	31		
45	04	09	23	03	10	20	08	24	24	52	78	48	33	92	

TABLE 4
Correlations Among Variables for Fourth Quarter of the Day

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1															
2	03														
3	-07	-57													
4	06	-40	25												
5	04	100	-53	-39											
6	16	-46	90	21	-41										
7	04	-53	98	24	-48	97									
8	-53	-42	51	12	-41	09	32								
9	-42	-18	30	21	-18	04	19	61							
10	-63	-02	06	05	-03	-14	-03	47	44						
11	-75	01	01	-16	00	-16	-08	39	24	40					
12	-51	-21	17	17	-21	-03	09	49	52	79	28				
13	-71	-06	03	-08	-07	-17	-07	45	27	45	82	40			
14	14	-26	79	09	-21	88	85	07	-04	-11	-18	-03	-17		
15	-39	-01	11	-07	-01	-03	04	34	13	39	13	34	20	-01	
16	-03	-08	11	05	-08	09	11	08	-02	14	07	17	07	07	19
17	08	-05	26	04	-04	28	28	04	01	-03	-09	-01	-11	23	06
18	-06	13	-08	-09	13	-08	-09	-03	-15	-10	11	-10	11	-01	10
19	10	-08	15	10	-07	18	17	00	-09	-14	-09	-16	-11	08	-03
20	07	-15	19	05	-14	27	22	-09	-18	-05	-05	-07	-06	21	03
21	18	-15	35	09	-14	38	38	04	-01	-16	-18	-08	-16	34	16
22	16	-09	19	10	-08	25	22	-07	-12	-21	-02	-10	-11	26	03
23	08	-10	16	08	-09	23	19	-09	-05	-11	-08	-11	-10	20	-09
24	05	03	05	-13	03	05	05	02	03	-04	-03	-05	-03	09	-01
25	-18	04	-05	-09	03	-13	-09	14	07	-04	18	-02	17	-12	17
26	-02	-01	08	05	-01	09	09	01	-06	-07	12	-02	13	09	15
27	-14	-01	09	02	00	05	07	11	-02	04	07	08	08	07	31
28	-19	00	-06	02	-01	-08	-07	04	06	05	21	07	24	-09	00
29	09	-04	05	12	-04	09	07	-05	-08	-06	-02	-07	01	06	11
30	10	-07	08	14	-06	09	09	-01	00	-12	-02	-04	-01	00	12
31	08	19	-19	05	18	-15	-17	-16	-09	-06	-05	-09	-08	-14	-11
32	02	11	-28	-05	09	-28	-28	-11	-08	01	00	00	02	-25	03
33	00	-12	03	-02	-12	04	03	-01	-08	-09	06	-05	01	-03	06
34	05	02	-03	10	02	01	-01	-07	-09	-14	-07	-16	-10	-06	18
35	-02	-04	-07	08	-05	-08	-07	03	08	02	08	12	09	-14	16
36	11	00	09	06	01	09	10	01	07	-07	-07	-05	-09	06	07
37	06	-11	13	-06	-11	19	15	-07	-10	-02	-06	-03	-10	22	-02
38	08	-07	02	04	-07	02	02	01	02	-05	-09	06	-13	-01	13
39	05	-03	-02	-06	-03	-02	-02	00	-01	-07	05	-04	09	-09	-05
40	18	-21	50	16	-18	55	53	04	-10	-22	-15	-10	-11	56	12
41	-37	-03	13	-05	-03	-01	06	34	12	40	14	35	20	01	97
42	00	-09	18	05	-08	17	18	08	-02	12	04	15	04	14	20
43	-23	02	00	-05	02	-08	-04	16	04	-04	25	01	25	-07	27
44	-05	-10	22	07	-10	19	21	14	-01	01	02	07	03	14	61
45	04	-16	37	12	-14	37	37	11	-06	-09	-05	00	-03	35	49

TABLE 4 CONTINUED

Var.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
17	06														
18	07	05													
19	-12	11	01												
20	-04	00	00	08											
21	18	06	-01	14	13										
22	11	01	-04	15	09	33									
23	-01	21	-03	-01	10	13	09								
24	08	21	-05	-06	-07	-04	-04	-05							
25	04	-08	04	-05	-10	09	-02	-05	-02						
26	13	00	11	03	07	20	11	04	-04	12					
27	-02	15	06	-06	-04	18	02	00	04	-02	11				
28	06	-16	-06	-01	-05	-03	03	-05	01	05	08	01			
29	16	06	04	06	15	25	22	00	15	08	09	11	-01		
30	23	17	03	04	07	21	14	06	-04	14	05	11	02	27	
31	-14	-06	11	01	05	-01	09	-10	-04	-03	02	04	13	09	00
32	04	-04	00	-09	-09	-07	-01	-15	09	00	-03	-01	04	07	05
33	15	-05	16	-02	05	11	15	-11	03	18	12	04	09	10	04
34	-06	-02	03	14	-04	09	12	-02	-05	18	03	12	-05	21	16
35	-02	-06	03	-04	00	06	11	01	-03	05	11	00	-04	17	18
36	03	10	01	02	-16	30	09	-04	-04	-01	07	05	02	08	12
37	-01	06	-01	-05	04	17	17	09	07	05	04	01	01	06	02
38	-04	-06	-13	00	01	14	08	-02	-05	00	01	-06	-04	07	06
39	05	10	-14	-04	09	10	-03	17	13	04	11	06	08	12	06
40	23	21	06	17	23	65	51	14	05	14	20	17	-04	32	27
41	42	07	11	-06	02	19	06	-08	01	16	17	28	02	15	17
42	96	34	08	-08	-04	19	10	05	13	02	12	03	01	17	27
43	09	-06	07	-04	-08	19	03	-04	-02	86	49	23	27	13	16
44	30	09	07	07	15	65	48	01	-01	30	34	27	09	47	37
45	32	16	08	14	19	72	54	09	03	28	31	27	03	46	38

Var.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
32	11														
33	08	02													
34	06	19	10												
35	-01	06	-01	10											
36	04	08	11	05	-02										
37	-07	-10	15	02	11	10									
38	04	-02	10	-02	08	13	-11								
39	-06	-01	03	-02	08	04	04	-10							
40	-05	-05	26	12	-01	20	22	07	11						
41	-13	04	09	15	14	08	-02	11	-03	17					
42	-14	02	12	-07	-03	06	00	-06	08	28	41				
43	02	-01	22	18	07	03	06	-02	10	22	27	06			
44	11	11	30	32	25	28	18	25	15	60	64	31	45		
45	05	04	32	29	16	28	20	20	15	84	53	35	41	92	

TABLE 5
Correlations Among Variables for Total Across All Quarters of the Day

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1															
2	08														
3	-14	-52													
4	09	-35	12												
5	08	100	-48	-35											
6	08	-41	87	20	-37										
7	-04	-48	97	17	-44	96									
8	-49	-30	41	-12	-30	-09	18								
9	-41	-27	35	24	-26	12	26	48							
10	-63	-11	13	02	-11	-07	04	43	45						
11	-82	-05	10	-11	-06	-07	02	39	29	52					
12	-56	-20	22	06	-20	01	13	46	53	82	44				
13	-81	-08	13	-10	-08	-06	04	42	30	52	87	46			
14	12	-21	79	00	-17	82	83	07	02	-07	-12	00	-11		
15	-25	-03	08	14	-03	16	12	-11	15	32	17	27	18	-01	
16	-07	-08	07	08	-08	15	11	-11	03	19	09	17	08	01	46
17	05	-02	12	03	-01	13	13	00	-03	-01	-06	-03	-05	12	00
18	03	01	-01	00	00	-02	-01	01	-06	-03	-01	-03	-02	00	-03
19	09	-07	10	02	-07	11	11	-01	-03	-06	-06	-07	-06	07	-01
20	06	-05	07	00	-05	12	09	-08	-09	-05	-03	-07	-02	07	04
21	18	-14	19	-04	-13	22	22	-03	-07	-11	-13	-07	-13	18	00
22	14	-11	10	01	-11	16	13	-10	-09	-10	-07	-07	-11	10	-02
23	03	-06	06	05	-06	14	10	-13	-04	-06	-04	-07	-03	07	04
24	03	01	03	-07	01	03	03	00	00	-02	-02	-03	-02	05	-01
25	02	-10	05	02	-10	10	08	-09	03	00	02	01	-01	00	14
26	00	-07	08	07	-06	14	12	-09	-02	01	04	02	02	06	18
27	-03	-09	09	00	-08	06	08	07	04	-01	02	04	02	02	05
28	-03	00	-04	-03	-01	-06	-05	03	-01	00	06	01	03	-06	00
29	10	-06	07	-02	-05	09	08	-04	-05	-04	-03	-04	-04	05	03
30	11	-06	06	-01	-06	06	07	00	-04	-07	-04	-04	-06	02	-02
31	04	12	-18	01	11	-13	-16	-12	-09	02	-03	-04	-03	-15	00
32	-07	03	-05	04	03	04	-01	-16	00	03	06	05	07	-05	32
33	03	-05	01	-04	-06	06	04	-08	-02	-03	02	-02	00	-01	09
34	13	-08	03	-09	-08	-03	01	11	-09	-12	-09	-13	-11	03	-23
35	04	-04	00	00	-04	-01	00	02	00	-03	00	02	01	-03	02
36	10	-01	07	-01	00	03	08	-03	-02	-07	-06	-05	-08	06	02
37	07	-07	04	-04	-07	10	07	-10	-08	-04	-04	-06	-06	06	02
38	05	-08	04	10	-08	13	09	-15	-01	-07	-06	02	-06	02	20
39	-02	02	00	02	02	03	02	-04	01	-01	04	02	03	-03	06
40	20	-18	28	-07	-17	27	29	05	-08	-12	-13	-08	-14	29	-12
41	-24	-04	03	15	-04	17	13	-12	14	32	17	28	18	00	99
42	-06	-08	09	08	-08	17	14	-11	02	18	07	16	07	04	44
43	00	-12	08	03	-12	13	11	-08	02	00	04	02	01	02	19
44	-02	-12	14	09	-12	25	20	-16	02	11	03	11	02	06	66
45	06	-16	22	03	-16	29	27	-09	-01	03	-03	05	-04	17	41

TABLE 5 CONTINUED

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
17	07														
18	04	12													
19	-04	08	05												
20	04	01	00	08											
21	21	15	09	26	16										
22	19	14	11	21	12	57									
23	06	12	-03	01	08	14	14								
24	05	15	-02	-02	-03	04	05	-02							
25	19	05	10	10	03	35	37	05	03						
26	20	01	04	09	11	17	16	08	-01	17					
27	06	16	07	02	02	29	20	00	04	13	04				
28	11	-02	06	04	00	19	20	01	03	17	06	10			
29	19	11	09	16	15	46	44	06	14	25	12	19	18		
30	21	17	17	15	08	40	32	04	01	26	13	14	17	37	
31	01	-01	07	02	02	09	15	01	-01	04	07	05	11	12	04
32	21	-03	-09	-09	04	-10	-07	03	04	01	06	-07	-04	-04	-06
33	17	01	09	07	11	26	26	00	05	28	17	09	15	18	13
34	-02	09	17	17	04	41	37	00	02	22	04	16	15	35	34
35	05	00	08	08	09	26	25	03	01	14	10	06	06	25	22
36	10	13	13	16	00	36	25	01	00	16	11	10	13	24	24
37	07	07	03	01	04	22	23	07	08	17	05	04	09	15	11
38	14	03	-01	04	06	22	21	06	00	19	09	04	04	16	11
39	04	04	-03	02	08	06	09	07	06	09	06	03	01	10	03
40	16	24	19	28	18	76	70	11	09	38	17	29	22	51	44
41	59	01	-02	-02	04	04	02	05	00	17	20	05	02	06	02
42	98	28	06	-02	04	24	21	08	09	20	20	09	11	20	23
43	25	08	12	12	07	43	42	07	04	89	48	37	34	31	31
44	55	13	10	18	18	59	55	14	05	49	34	25	22	46	37
45	46	21	16	25	20	75	70	15	08	52	31	30	24	56	45

Var.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
32	-01														
33	10	03													
34	11	-18	14												
35	04	-02	11	25											
36	06	-02	16	22	09										
37	-01	02	14	12	14	14									
38	03	13	16	-02	09	15	05								
39	-03	08	09	01	08	08	03	13							
40	09	-16	33	52	24	35	24	13	09						
41	00	33	11	-21	03	03	03	21	06	-08					
42	01	20	17	00	05	13	09	14	05	21	57				
43	09	01	32	25	17	21	17	19	10	46	21	26			
44	15	23	36	23	27	32	24	41	22	51	69	56	59		
45	16	10	40	39	30	38	27	35	20	80	46	49	62	91	

Var.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45

Intercorrelations among the police (criterion) variables show some correlation between certain variables, but the only really substantial correlations are between those variables that were combined into composites and the respective composites.

Correlations between variables in the police and weather sets of variables are, as expected, generally lower than those within sets, that is, among police or weather variables. It is noteworthy, therefore, that some of the correlations between police and weather variables not only are fairly high, but are also consistent across time periods. In particular, variables (40) Assist and (41) Accidents combined have rather substantial correlations with a number of the weather variables, and with the same weather variables, in most of the time periods. Only six of the 30 police variables included failed to show more significant correlations with weather variables than could be accounted for by chance. Moreover, many of the police variables had such low frequencies, even after combination in six-hour totals, that the high degree of skew would tend to limit the correlations. Most important, however, the police-by-weather correlations as a whole are quite obviously highly significant.

Criterion Factor Analysis

Each of the five correlation matrices was factored by the Criterion Factorization Method using each of the nine selected police variables in turn as the criterion. This involved forty-five analyses, each of which was terminated when all of the residual validity coefficients were less than .005

in absolute value. Using an assumed average reliability of .95 for all of the predictors, the estimated reliability of each factor was computed. Only factors with estimated reliabilities of at least .50 were entered into rotation. The reduced factor matrices were then rotated separately by the Varimax Method, followed by extension of the rotated factors to the criterion variable.

The obtained approximate multiple correlations for each of the five time periods and each of the nine criterion variables are presented in Table 6, along with the means of the criterion variables. It is readily apparent that criterion variables (40) Assist and (41) Accidents combined not only have the highest multiple correlations, but also that these high multiple correlations are consistent over the four quarters of the and for the total day.

It was noted that these two variables also represent the two categories of police calls with the highest mean number of incidents. In order to determine whether this was a general result, the multiple correlations were correlated with the respective means over the nine criterion variables. The resulting correlations, for the five time periods, ranged from .80 to .93, and were all significant beyond the .01 level of significance. Comparison across the four quarters of the day for each variable also showed a relationship between mean number of incidents and magnitude of the obtained multiple correlations. If the correlations between police and weather variables were essentially random and primarily the result of sampling variations, the trend should be expected to be in just the opposite direction. That is, increases in the number of incidents should make the criterion variables more stable, thereby reducing the correlations and, consequently, the multiple correlations.

TABLE 6

Multiple Correlations and Means of Nine Criterion Variables

	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Total Day	
	Mult. Corr.	Mean	Mult. Corr.	Mean	Mult. Corr.	Mean	Mult. Corr.	Mean	Mult. Corr.	Mean
17. Assault	.21	.13	.32	.06	.24	.09	.31	.23	.14	.13
20. Demented Person	.23	.12	.26	.20	.18	.26	.34	.38	.17	.24
21. Disturbance	.36*	3.03	.33	.80	.21	2.36	.42**	6.46	.31	3.16
22. Domest. Disturb.	.31	2.25	.16	.97	.16	2.35	.40**	5.83	.24	2.85
29. Fight	.27	.79	.24	.20	.33	.65	.20	1.75	.19	.85
31. Fire Call	.32	.53	.35	.19	.34	.53	.26	.79	.21	.51
40. Assist	.54**	16.57	.44**	5.26	.34	10.08	.62**	24.47	.40**	14.10
41. Accident Combined	.36*	3.18	.51**	10.96	.54**	20.71	.53**	11.06	.51**	11.48
43. Drunk Combined	.27	2.07	.30	1.03	.31	3.26	.36*	4.42	.22	2.70

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

The most likely explanation of the obtained relationship between criterion means and multiple correlations is that the lower the mean, the greater the degree of skew in the criterion; extreme skew tends to reduce the correlation of the skewed variable with another. This is illustrated with variable (24) Mad dog, which had only three police calls in all 712 quarter-day periods; it would have been very surprising if this variable had a substantial correlation with any other variable. It appears that the higher the mean, the higher the ratio of true to error variance in the criterion variable, with the result that variables with higher mean numbers of incidents tend to be more stable than infrequently occuring categories of police calls.

In addition to Assist and Accidents combined, variables (21) Disturbance, (22) Domestic disturbance, and (43) Drunks combined also have significant multiple correlations for one or more time periods. These significance levels are based on the assumption of 14 predictor variables. In view of the redundancy among several of the predictor variables, however, the actual rank of the matrix of intercorrelations among the predictors is almost certainly less than 14, and is probably about 7 to 10. The levels of significance reported here are therefore probably highly conservative. Using the conservative levels of significance, 13 of the 45 multiple correlations are significant at the .05 level and 9 are significant at the .01 level, far more than could be attributed to sampling error.

The multiple correlations, of course, determine whether or not police calls can be predicted from weather patterns. It is also necessary to determine the reliability of the prediction. The factors derived by the Criterion

Factorization Method are of considerable aid in determining reliability. By comparing factors across time periods, it can be determined which, if any, of the factors are consistent. Factors which are not consistent across time periods may be time-specific; however, it is not feasible to decide whether they are time-specific or due to error, without replication.

Ordinary regression, or beta, weights are difficult to interpret because they are based on the assumption that the criterion is composed of a single factor; that is, separate components of the criterion, including sampling error, are lumped together into a single set of beta weights. This procedure of combining all components into a single composite leads to the well-known phenomenon of suppressor variables, which complicates interpretation greatly. Crifac factors, on the other hand, separate the predictable components of the criterion, so that stable components can be matched across different samples. Factors which do not match might then be considered to be essentially composed of specific and error variance.

Research with the Crifac Method has indicated the need for rotation of the factors in order to maximize the meaningfulness of the results. Accordingly, the 45 factor matrices of this study were all rotated by the Varimax Method. The Varimax rotations did indeed clear up the factor patterns to a considerable extent. Consequently, the rotated factors are discussed here in preference to the unrotated factors. Some problems of rotation appeared, however, which tend to offset to some extent the value of the rotation. These problems are discussed in detail in a subsequent section.

The Varimax-rotated factors are presented in Tables 7 through 15, in the order in which the criterion variables appeared in the original correlation matrix. The unrotated factors are included in the Appendix, in the same order. All factors were listed in rearranged order to permit side-by-side comparison of factors that matched across time periods. The bottom row of each factor matrix, labelled "99," represents loadings of the criterion on the respective factors. If a criterion loading is negative, the entire factor may be considered to be reversed. In describing the factors, a positive loading is "high" and a negative loading is "low." The terms "high" and "low," of course, are relative to the range of values included for that variable. For example, "high," applied to a temperature factor, is intended to indicate that temperatures greater than the mean temperature are associated with frequencies of the criterion which are above the criterion mean.

Criterion Factors

Assault. After Varimax rotation, variable (17) Assault (see Table 7) shows three factors which might be tentatively identified as matching across at least several time periods.

Factor A, which appears for all but the third quarter of the day, clearly represents temperature. Loadings of the criterion range from .08 to .30. It is noteworthy that the highest loadings of the criterion variable are in those quarters of the day having the highest mean number of incidents, rather than the quarters having the highest multiple correlations. Coefficients of congruence among the time-period components of Factor A range from .89 to .97. This factor can, therefore, be considered consistent across time periods.

TABLE 7

Varimax Factors from Criterion Variable 17, Assault, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	05	08	--	12	34	93	-87	84	-82	--	-16	03	-08	-00	--
2. Sea Level Pressure	-52	23	--	-26	-42	01	-12	30	-09	--	-62	94	60	93	--
3. Dew Point Temp.	95	-91	--	90	82	-04	24	-53	19	--	20	-25	00	-34	--
4. Wind Speed	13	-00	--	13	22	29	-16	11	05	--	64	-19	-17	-51	--
5. Station Pressure	-48	18	--	-21	-38	02	-12	29	-09	--	-62	95	62	94	--
6. Dry Bulb Temp.	94	-97	--	92	92	07	03	-10	-13	--	17	-15	22	-24	--
7. Wet Bulb Temp.	95	-95	--	93	90	01	15	-35	04	--	19	-20	11	-30	--
8. Relative Humidity	45	-12	--	23	-05	-48	70	-83	75	--	20	-39	-28	-30	--
9. Total Sky Cover	14	-19	--	17	01	-20	53	-59	66	--	74	-14	-51	-12	--
10. Precip., No. Hrs.	-11	00	--	00	-25	-40	81	-84	83	--	59	-04	-00	10	--
11. Fog, No. Hrs.	-05	-07	--	-21	-35	-92	88	-81	66	--	03	00	20	-01	--
12. Precip., Dichot.	-07	-04	--	-07	-15	-46	75	-79	77	--	68	-21	-13	-10	--
13. Fog, Dichotomous	-02	-07	--	-22	-33	-91	88	-80	68	--	05	-00	16	-10	--
14. Day No.	85	-94	--	89	86	12	-08	-17	-16	--	-10	01	30	-06	--
99. Assault	12	-08	--	30	14	04	07	11	-03	--	09	11	18	03	--

TABLE 7 CONTINUED

Variable	Residual Factors Quarter			
	1	2	3	2
1. Visibility	-09	04	03	-38
2. Sea Level Pressure	06	-15	-43	-00
3. Dew Point Temp.	07	10	06	05
4. Wind Speed	26	83	84	01
5. Station Pressure	06	-15	-44	-00
6. Dry Bulb Temp.	-03	04	-01	-00
7. Wet Bulb Temp.	01	08	02	02
8. Relative Humidity	39	16	11	19
9. Total Sky Cover	-02	64	-21	-03
10. Precip., No. Hrs.	44	07	-02	-06
11. Fog, No. Hrs.	00	-07	-01	-15
12. Precip., Dichot.	08	11	-04	-07
13. Fog, Dichotomous	-00	-11	-01	06
14. Day No.	01	-02	-05	-03
99. Assault	13	08	09	25

Factor B, which appears for each of the four quarters of the day, but not for the total day, appears to be essentially a precipitation-fog factor. The direction of the signs indicates that it is the absence of precipitation and fog which leads to an increase in assaults, except for the second quarter. As will be discussed more fully below, it is not clear whether the change of sign of prediction for the second quarter indicates a different relationship between assaults and precipitation-fog for this one part of the day, or whether the sign of the criterion is inconsistent as an artifactual result of the rotation. Coefficients of congruence among the components of Factor B range from .86 to .98. Except for the direction of the loading of the criterion, therefore, Factor B appears quite consistent across time periods.

Factor C, which like Factor B appears only for the four separate quarters of the day, presents a somewhat less clear match of factors across time periods. The two measures of pressure appear among the higher factor loadings, but Wind speed and Total sky cover along with the two precipitation variables all appear for the first quarter. The coefficients of congruence among the components of Factor C range from .69 to .96, and only the second and fourth quarters can be considered as definitely denoting the same factor. The first quarter, besides having loadings for additional variables, has a criterion loading in the opposite direction from that of the other time periods. Factor C, then, can be identified as a possible, but uncertain, match.

The only noteworthy observation concerning the remaining, unmatched, factors is that the Varimax rotation completely changed the character of the fifth factor for the second quarter of the day. After rotation, this factor has only three rather low loadings, although the criterion has a rather high loading. In fact, the criterion takes a higher loading on this factor than on any other factor from any time period. This finding, like that of the inconsistent direction of otherwise clearly matching factors, appears for many of the criterion variables, and it is not clear whether this should be considered a true result or an artifact of the Varimax rotation.

Demented Person. Variable (20) Demented Person (see Table 8) produced two reasonably consistent factors and a marginally consistent third factor.

Factor A is clearly a combination of high temperature and low pressure, although pressure almost drops out for the second quarter and for the total day. The total day time period also involves other variables; as a consequence, the coefficients of congruence between the total day and the four quarter-day periods range only from .68 to .77. Coefficients of congruence among the other four time periods, however, range from .87 to .98. The second quarter of the day is loaded by the criterion in the opposite direction from the other time periods, but its loading of .01 is so small as to be highly susceptible to rotational changes. The overall pattern suggests that essentially the same factor is present in the four time periods, but that prediction is based on deviations of the predictors from the normal for that time of day; hence, the less clear factor pattern for the combined-day time period.

TABLE 8

Varimax Factors from Criterion Variable 20, Demented Person, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	62	-10	12	04	58	-84	89	-90	-83	--	34	15	--	20	10
2. Sea Level Pressure	-75	-27	-79	-73	-38	-28	17	-18	-16	--	-03	07	--	18	-08
3. Dew Point Temp.	94	91	84	91	61	-07	-23	21	-01	--	-12	-07	--	-23	15
4. Wind Speed	42	-04	20	36	33	04	23	-07	01	--	-11	-43	--	-27	-19
5. Station Pressure	-72	-22	-76	-70	-35	-30	17	-18	-17	--	-03	08	--	18	-07
6. Dry Bulb Temp.	91	97	70	91	67	-21	-03	-23	-19	--	-08	03	--	07	45
7. Wet Bulb Temp.	93	95	81	93	66	-15	-14	01	-11	--	-10	-02	--	-10	29
8. Relative Humidity	50	15	37	29	-06	46	-70	81	41	--	-20	-32	--	-68	-49
9. Total Sky Cover	39	16	29	07	10	30	-44	61	20	--	-47	-62	--	-69	-66
10. Precip., No. Hrs.	04	-03	-11	-00	-42	24	-80	92	77	--	-89	03	--	-32	-30
11. Fog, No. Hrs	-06	09	-07	-09	-64	85	-87	84	76	--	-19	-00	--	01	09
12. Precip., Dichot.	09	01	01	12	-26	25	-74	83	65	--	-91	-04	--	-45	-40
13. Fog, Dichotomous	-03	08	-02	-05	-62	86	-88	83	78	--	-18	02	--	-06	08
14. Day No.	70	94	58	78	66	-37	08	-14	-22	--	-05	-09	--	12	30
99. Demented Person	15	-01	02	26	05	00	11	06	-00	--	16	22	--	21	15

TABLE 8 CONTINUED

Variable	Residual Factors Quarter	
	2	3
1. Visibility	05	-06
2. Sea Level Pressure	-83	21
3. Dew Point Temp.	26	01
4. Wind Speed	57	-63
5. Station Pressure	-84	22
6. Dry Bulb Temp.	18	-04
7. Wet Bulb Temp.	23	-01
8. Relative Humidity	30	08
9. Total Sky Cover	34	01
10. Precip., No. Hrs.	15	-17
11. Fog, No. Hrs.	-06	24
12. Precip., Dichot.	29	-28
13. Fog, Dichotomous	-04	31
14. Day No.	-07	-06
99. Demented Person	-05	16

In fact, the frequency of Demented Person incidents increases throughout the four quarters of the day to a maximum in the fourth quarter, while temperature, the highest-loading predictor, decreases substantially during the fourth quarter.

Factor B is clearly a combination of precipitation and fog. It appears only for the four separate quarters of the day. Coefficients of congruence among the components of this factor range from .87 to .98, indicating a fairly clear match across the four quarters of the day. The sign of the criterion variable loading for the first and third quarters is opposite to that for the second and fourth quarters. Loadings of the criterion, however, are all so small as to make the factor of relatively little importance for prediction purposes. In fact, in the first and fourth quarters, the loading of the criterion is so small as to differ from zero only in the third decimal.

Factor C does not really qualify as a consistent factor, inasmuch as the coefficients of congruence among the components range from .38 to .83. There is, however, a certain amount of consistency in that Relative humidity, Total sky cover, and Precipitation load to some extent on most of the factors. What is most important, however, is that rotation resulted in these similar factors all having fairly substantial loadings by the criterion variable.

Disturbance. Variable (21) Disturbance (see Table 9) has three very clear factors.

Factor A is obviously temperature. The third quarter of the day shows some variation from the other time periods in the pattern of loadings, with coefficients of congruence ranging from .74 to .83 with the other components

TABLE 9

Varimax Factors from Criterion Variable 21, Disturbance, by Time Periods

Variable	Factor A Quarter 1	2	3	4	Tot.	Factor B Quarter 1	2	3	4	Tot.	Factor C Quarter 1	2	3	4	Tot.
1. Visibility	08	-09	54	11	07	93	-90	--	83	-84	04	-01	--	-00	--
2. Sea Level Pressure	-29	-28	-27	-29	-71	08	-18	--	10	-24	86	85	--	91	--
3. Dew Point Temp.	92	92	62	92	92	-04	24	--	-18	14	-28	-25	--	-30	--
4. Wind Speed	07	-05	27	12	17	02	-18	--	-02	-00	-74	-65	--	-55	--
5. Station Pressure	-24	-23	-23	-24	-68	08	-18	--	11	-25	87	85	--	92	--
6. Dry Bulb Temp.	92	97	85	90	88	06	03	--	15	-15	-27	-13	--	-25	--
7. Wet Bulb Temp.	93	95	76	94	93	01	15	--	-02	00	-27	-19	--	-28	--
8. Relative Humidity	40	15	-23	32	23	-46	74	--	-77	62	-15	-40	--	-18	--
9. Total Sky Cover	15	15	-14	20	24	-31	45	--	-67	59	-36	-40	--	-07	--
10. Precip., No. Hrs.	08	-02	-48	-11	02	-69	80	--	-74	82	-07	-07	--	-08	--
11. Fog, No. Hrs.	-13	09	-52	-14	-08	-83	85	--	-72	79	00	11	--	08	--
12. Precip., Dichot.	07	02	-32	-00	14	-59	75	--	-71	79	-04	-24	--	-24	--
13. Fog, Dichotomous	-09	09	-51	-12	-05	-85	88	--	-77	80	-01	09	--	03	--
14. Day No.	92	93	81	87	76	13	-09	--	16	-22	04	03	--	-06	--
99. Disturbance	26	25	07	38	24	15	-07	--	13	-14	-02	07	--	-05	--

TABLE 9 CONTINUED

Variable	Residual Factors Quarter 1	2	3	5
1. Visibility	-07	-00	01	09
2. Sea Level Pressure	-21	00	-63	-00
3. Dew Point Temp.	17	-01	32	-08
4. Wind Speed	-05	-17	-42	-85
5. Station Pressure	-21	00	-63	-01
6. Dry Bulb Temp.	09	-05	26	-17
7. Wet Bulb Temp.	13	-04	30	-14
8. Relative Humidity	35	12	16	14
9. Total Sky Cover	56	-62	-00	-36
10. Precip., No. Hrs.	16	-08	-09	01
11. Fog, No. Hrs.	11	-22	00	-00
12. Precip., Dichot.	56	-05	-05	01
13. Fog, Dichotomous	05	-06	04	-00
14. Day No.	-07	-01	03	-07
99. Disturbance	19	17	18	12

of this factor. Coefficients among the other components of the factor all exceed .90. The third quarter also is the only time period in which the criterion does not take a substantial loading on the factor.

Factor B, clearly a precipitation-fog factor, occurs for all but the third quarter of the day. Coefficients of congruence among the four time period components for which the factor does appear range upward from .96, indicating that this is quite definitely the same factor across time periods.

Factor C, composed of wind speed and pressure, occurs only for the first, second, and fourth quarters of the day; the second quarter is reversed in direction from the other two periods. The three components of this factor, however, have coefficients of congruence of .96 or higher, and thus clearly denote the same factor. Loadings of the criterion, however, are fairly low, so that the factor contributes only a small amount toward prediction. It is notable that the third quarter produced a factor rather similar to Factor C, with the same three high-loading variables, but Wind speed was loaded in the opposite direction from that observed for Factor C.

Several aspects of the Disturbance factors are readily apparent. The first two factors are exceptionally clear, consistent in direction, and are substantially loaded by the criterion. On the other hand, the third quarter of the day appears to be quite different from the other time periods. The lack of consistency of the third quarter quite possibly is responsible for the low multiple correlation for that quarter. It is also noteworthy that the third quarter does not have a low frequency as might be expected from the general finding that low multiple correlations tend to be associated with low

frequencies. Indeed, it is the second quarter which has a low frequency of police calls and which might be expected to produce puzzling results.

Domestic Disturbance. Variable (22) Domestic Disturbance (see Table 10), has a factor pattern rather similar to that described for Disturbance. Factor A, temperature, occurs for all five time periods. Unlike Disturbance, however, the criterion variable has a substantial loading on this factor only in the first and fourth quarters of the day. Several of the time periods show moderate loadings on other variables. The coefficients of congruence among components of this factor range from .65 to .99, but in a consistent pattern. That is, quarters 1, 3, and 4 have coefficients among themselves all exceeding .90; the second quarter and the total-day have a coefficient of .94; and the coefficients between the two clusters range from .65 to .79. The second-quarter and the total-day periods also had coefficients all of about .6 with the components of Factor B, suggesting that for these two time periods, Factor A is actually a composite of Factors A and B.

Factor B, precipitation-fog, occurred only for time periods 1, 3, and 4; for the other two time periods, precipitation-fog showed up with moderate loadings on several factors, especially Factor A. Coefficients of congruence among the components of Factor B ranged from .89 to .98. The third time period has the criterion loaded in the opposite direction from the other two periods, but the maximum loading of the criterion on this factor for any of the three time periods is only .03.

Factor C is primarily low pressure and high wind speed but other variables load on the factor in various time periods. The coefficients of

TABLE 10

Varimax Factors from Criterion Variable 22, Domestic Disturbance, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	17	45	-06	05	51	-87	--	-95	-77	--	18	33	02	06	--
2. Sea Level Pressure	-43	01	31	-44	-20	-17	--	-14	05	--	78	-76	-90	-65	--
3. Dew Point Temp.	91	57	-93	92	62	06	--	23	03	--	-28	02	20	21	--
4. Wind Speed	44	08	16	02	34	12	--	-17	-03	--	-03	44	60	90	--
5. Station Pressure	-39	05	26	-40	-17	-18	--	-14	05	--	79	-78	-91	-66	--
6. Dry Bulb Temp.	90	73	-93	94	69	-08	--	-18	-07	--	-27	-00	08	17	--
7. Wet Bulb Temp.	91	65	-97	95	67	-00	--	04	-02	--	-27	00	15	20	--
8. Relative Humidity	43	-27	-21	26	-07	57	--	75	28	--	-16	07	20	11	--
9. Total Sky Cover	48	-17	-13	05	10	56	--	45	10	--	10	07	10	13	--
10. Precip., No. Hrs.	11	-46	04	-12	-42	66	--	86	36	--	-01	-31	-03	-01	--
11. Fog, No. Hrs.	-23	-41	08	-02	-60	80	--	89	90	--	-17	-39	-00	-10	--
12. Precip., Dichot.	20	-41	-03	-03	-31	72	--	72	22	--	05	-13	-01	15	--
13. Fog, Dichotomous	-21	-46	07	-06	-54	79	--	87	89	--	-21	-37	01	02	--
14. Day No.	73	81	-88	90	71	-27	--	-15	-08	--	-18	-13	-06	-02	--
99. Domestic Disturbance	28	01	-04	25	09	-03	--	02	-03	--	10	06	08	07	--

TABLE 10 CONTINUED

Variable	Factor D Quarter 1	Factor D Quarter 2	Factor D Quarter 3	Factor D Quarter 4	Factor D Tot.	Residual Factors Quarter 2	Residual Factors Quarter 4
1. Visibility	--	--	-03	46	35	-12	16
2. Sea Level Pressure	--	--	04	27	-44	-01	19
3. Dew Point Temp.	--	--	-09	-23	07	04	-05
4. Wind Speed	--	--	-01	-01	-10	-39	16
5. Station Pressure	--	--	04	28	-44	-01	20
6. Dry Bulb Temp.	--	--	08	09	32	-11	-03
7. Wet Bulb Temp.	--	--	-00	-09	19	-04	-04
8. Relative Humidity	--	--	-28	-75	-44	45	-08
9. Total Sky Cover	--	--	-65	-74	-58	-26	-04
10. Precip., No. Hrs.	--	--	-27	-70	-32	-20	-13
11. Fog, No. Hrs.	--	--	-00	-20	-13	10	19
12. Precip., Dichot.	--	--	-43	[illegible]	-30	-18	18
13. Fog, Dichotomous	--	--	-05	-23	-21	05	-05
14. Day No.	--	--	-21	09	12	-10	09
99. Domestic Disturbance	--	--	12	16	22	14	25

congruence among the components range from .56 to .93; hence, this can be identified as a consistent factor only in the loosest sense. The factor appears for each of the four quarters, but not for the total day. Moreover, the first quarter of the day, which has the highest loading of the criterion on this factor, is loaded in the opposite direction from the other time periods, and Wind speed takes a negligible loading in this quarter of the day.

Factor D, which might be called a tentative factor, appeared for this criterion variable, although it did not show up for Disturbance. The factor is composed of low sky cover, humidity, and precipitation, and occurs for the third and fourth quarters and for the total-day period. Coefficients of congruence among the components range from .61 to .83, making its status as a consistent factor rather questionable. The most notable aspect of this factor is that the criterion loads in the same direction and in some magnitude in all three time periods.

The two remaining factors show no real similarity to other factors; in fact, they do not have more than moderate loadings on any of the predictors. They are, though, noticeably loaded by the criterion. In particular, the fifth factor of the fourth quarter of the day has a loading on the criterion of .25, which is higher than the loading of any of the predictors on that factor.

The finding of so poorly defined a factor, which is nevertheless substantially loaded on the criterion, suggests that the Varimax rotation was not especially good for these data. The results for the factors in general suggest that a different method of rotation might have cleared up many of the ambiguities. However, this must remain a conjecture pending further investigation of the Crifac Method.

Fight. Criterion variable (29) Fight (see Table II) is composed of three factors which appear to be at least somewhat consistent over time periods.

Factor A is clearly high temperature, but with low pressure present in varying degrees in the different time periods. Coefficients of congruence among the components range from .80 to .99 and show no consistencies indicative of subclusters. The loading of the criterion on the factor is reversed for the third quarter of the day, relative to the other quarters, but this loading is only .01, hence, highly susceptible to sign change as a result of small rotational changes.

Factor B is precipitation-fog and occurs for all time periods but the fourth quarter of the day. Coefficients of congruence among components of the factor range from .81 to .99, indicating rather strong consistency. The third quarter of the day is reversed with respect to the other quarters.

Factor C is pressure and appears only for the second and third quarters of the day. The coefficient of congruence between the two time periods is .89, but negative, indicating that the factor is reversed in the two quarters. The loading of the criterion is, however, only .04 for the second quarter and approximately zero for the third quarter, so that the direction of the loading of the criterion would be highly susceptible to rotational influences.

The residual factors are notable mainly for the fact that they tend to be loaded fairly well by the criterion. For the third and fourth quarters and the total day, one residual factor predicts the criterion better than all the consistent factors. The variables wind speed, relative humidity, and total sky

TABLE II

Varimax Factors from Criterion Variable 29, Fight, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	-03	-01	-08	46	02	91	84	-82	--	-93	--	16	-00	--	--
2. Sea Level Pressure	76	-22	27	-48	-71	26	17	-12	--	-19	--	86	-89	--	--
3. Dew Point Temp.	-89	88	-88	74	91	07	-23	27	--	15	--	-34	30	--	--
4. Wind Speed	-41	25	16	11	15	-03	-04	00	--	-13	--	07	42	--	--
5. Station Pressure	73	-18	23	-45	-67	28	17	-12	--	-20	--	86	-90	--	--
6. Dry Bulb Temp.	-91	95	-92	81	89	15	-02	-21	--	-15	--	-23	17	--	--
7. Wet Bulb Temp.	-91	93	-94	79	93	12	-14	05	--	00	--	-28	25	--	--
8. Relative Humidity	-30	10	-15	04	20	-28	-70	86	--	65	--	-44	24	--	--
9. Total Sky Cover	-28	24	-00	00	15	-28	-57	67	--	47	--	-25	27	--	--
10. Precip., No. Hrs.	-06	00	05	-34	-01	-56	-83	90	--	74	--	-00	-02	--	--
11. Fog, No. Hrs.	07	06	11	-57	-02	-87	-85	69	--	83	--	01	10	--	--
12. Precip., Dichot.	-08	03	-07	-17	08	-55	-76	89	--	70	--	-21	-03	--	--
13. Fog, Dichotomous	04	04	07	-57	00	-87	-85	71	--	85	--	-01	07	--	--
14. Day No.	-73	88	-94	75	78	29	13	-05	--	-14	--	-15	-06	--	--
99. Fight	-05	23	01	03	09	13	05	12	--	-07	--	04	00	--	--

TABLE 11 CONTINUED

Variable	Residual Factors Quarter 1	3	4	5	5
1. Visibility	-17	-39	35	-00	22
2. Sea Level Pressure	-06	07	-13	07	-19
3. Dew Point Temp.	33	00	00	-16	-06
4. Wind Speed	10	-62	52	-71	-00
5. Station Pressure	-06	07	-12	07	-20
6. Dry Bulb Temp.	15	07	21	-08	-02
7. Wet Bulb Temp.	24	03	10	-14	-04
8. Relative Humidity	76	-04	-44	-14	-06
9. Total Sky Cover	57	-16	52	-70	06
10. Precip., No. Hrs.	32	18	-47	-25	33
11. Fog, No. Hrs.	11	61	-05	15	10
12. Precip., Dichot.	47	-06	-45	-33	26
13. Fog, Dichotomous	10	53	-00	13	03
14. Day No.	03	-05	12	00	-29
99. Fight	17	30	19	06	13

cover appear frequently as the markers of the residual factors. Since these are the only predictor variables which are not substantially correlated with another predictor, there is a distinct possibility that these may be the most important factors, but have not come out consistently because both the factorization and rotation would tend to emphasize the variables which are highly correlated with others.

The third quarter of the day deserves special mention because of its peculiarities. Factors A, B, and C are all reversed in sign for the third quarter relative to the other time periods and the loadings of the criterion on these factors are all small. In fact, the unmatched factor for the third quarter has a loading by the criterion which alone almost entirely accounts for the multiple correlation.

Fire Call. Criterion variable (31) Fire Call (see Table 12) produced two strongly consistent factors and one moderately consistent factor.

Factor A is clearly composed of low temperature and moderately high pressure. Coefficients of congruence among the components of this factor are .94 or higher, except for the coefficients between the fourth quarter and the other time periods, which range from .78 to .88. The slightly lower congruence of the fourth quarter with other time periods appears to be a function of the rotation, since the fourth quarter of the unrotated factor is highly consistent with the other components of this factor.

Factor B is primarily precipitation-fog, with precipitation of minor importance in the first quarter. The factor does not appear at all for the

TABLE 12

Varimax Factors from Criterion Variable 31, Fire Call, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	-06	06	-04	21	-02	91	-89	-93	--	-86	12	-00	-04	--	--
2. Sea Level Pressure	60	29	60	57	64	00	-20	-14	--	-25	31	82	31	--	--
3. Dew Point Temp.	-96	-92	-94	-77	-96	-05	25	20	--	14	-16	-22	-10	--	--
4. Wind Speed	-27	07	-01	-73	-20	12	-16	-06	--	06	-43	-74	-03	--	--
5. Station Pressure	56	25	56	55	60	01	-19	-14	--	-26	31	83	32	--	--
6. Dry Bulb Temp.	-94	-97	-92	-63	-90	05	04	-20	--	-15	-17	-14	21	--	--
7. Wet Bulb Temp.	-95	-95	-97	-73	-96	00	16	02	--	00	-17	-19	06	--	--
8. Relative Humidity	-46	-17	-25	-51	-25	-44	74	75	--	63	-06	-29	-44	--	--
9. Total Sky Cover	-18	-17	-15	-50	-26	-24	53	55	--	62	-80	-41	-44	--	--
10. Precip., No. Hrs.	02	00	02	-31	00	-28	82	92	--	79	-12	-00	-01	--	--
11. Fog, No. Hrs.	08	-05	05	-06	05	-93	84	85	--	79	-08	02	-05	--	--
12. Precip., Dichot.	04	-07	-09	-44	-10	-28	77	81	--	78	-44	-12	-08	--	--
13. Fog, Dichotomous	02	-04	04	-12	02	-92	86	82	--	80	04	02	-16	--	--
14. Day No.	-80	-92	-81	-50	-81	17	-08	-17	--	-20	04	02	-07	--	--
99. Fire Call	13	25	17	11	17	-09	08	-01	--	-04	16	15	25	--	--

TABLE 12 CONTINUED

Variable	Residual Factors Quarter				
	1	2	3	4	5
1. Visibility	-24	-09	12	29	06
2. Sea Level Pressure	-40	-10	05	45	-11
3. Dew Point Temp.	04	-01	04	-46	-08
4. Wind Speed	17	-14	84	56	60
5. Station Pressure	-41	-10	05	45	-11
6. Dry Bulb Temp.	-05	-04	-00	-32	21
7. Wet Bulb Temp.	-00	-03	03	-40	06
8. Relative Humidity	35	12	05	-45	-54
9. Total Sky Cover	20	-02	24	-08	-10
10. Precip., No. Hrs.	85	15	01	-12	31
11. Fog, No. Hrs.	06	-38	-13	-31	-06
12. Precip., Dichot.	73	01	13	-15	21
13. Fog, Dichotomous	15	-16	-12	-33	-06
14. Day No.	-08	10	08	-31	-06
99. Fire Call	20	17	12	23	11

fourth quarter of the day. Coefficients of congruence among the time period components of the factor range from .89 to .99, indicating a high degree of consistency. Loadings of the criterion on the factor in the different time periods are rather low, and the sign of the loading of the criterion for the second quarter and the total day is reversed with respect to the first and second quarters.

Factor C can be tentatively identified for the first three quarters of the day. The coefficients of congruence among the components of this factor range only from .60 to .76, so that this factor can be considered only a marginal match across the three time periods. The factor appears to be composed primarily of Pressure, Wind speed, and Total sky cover, but there is considerable variation as to which are the leading variables in the different time periods. There is, however, a considerable amount of consistency. Moreover, the criterion variable takes relatively substantial loadings on this factor in all three of the time periods.

The remaining factors show little consistency across time periods, but are loaded rather substantially by the criterion.

Assist. Variable (40) Assist (see Table 13) is the criterion variable which was found to have the highest and most consistent multiple correlation. It is not especially surprising, therefore, that it also produces one of the clearest factor patterns.

Factor A is clearly composed mainly of high temperature plus a small component of low pressure. The factor occurs for all five time periods, and

TABLE 13

Varimax Factors from Criterion Variable 40, Assist, by Time Periods

Variable	Factor A Quarter 1	2	3	4	Tot.	Factor B Quarter 1	2	3	4	Tot.	Factor C Quarter 1	2	3	4	Tot.
1. Visibility	07	-08	20	04	04	92	86	--	-89	-84	00	08	--	04	--
2. Sea Level Pressure	-30	-35	-51	-36	-69	09	24	--	-00	-25	86	60	--	77	--
3. Dew Point Temp.	93	92	90	90	94	-04	-22	--	13	13	-26	-27	--	-33	--
4. Wind Speed	04	-05	00	09	18	06	24	--	-04	01	-73	-75	--	-30	--
5. Station Pressure	-25	-31	-47	-31	-65	10	25	--	-01	-26	87	60	--	77	--
6. Dry Bulb Temp.	93	97	94	96	87	05	-02	--	-13	-17	-26	-14	--	-15	--
7. Wet Bulb Temp.	93	95	96	95	94	01	-13	--	00	-01	-26	-21	--	-26	--
8. Relative Humidity	38	15	13	18	27	-40	-69	--	64	65	-09	-42	--	-44	--
9. Total Sky Cover	10	12	08	02	24	-23	-38	--	50	58	-34	-71	--	-52	--
10. Precip., No. Hrs.	04	-03	-17	-12	01	-68	-80	--	72	81	-16	-13	--	-27	--
11. Fog, No. Hrs.	-09	08	-18	-01	-06	-85	-85	--	93	73	05	01	--	17	--
12. Precip., Dichot.	03	03	-02	-05	13	-59	-75	--	65	78	-11	-26	--	-37	--
13. Fog, Dichotomous	-05	08	-17	-03	-04	-88	-87	--	85	79	03	03	--	15	--
14. Day No.	92	93	87	92	79	13	09	--	-10	-21	04	03	--	05	--
99. Assist	44	41	34	56	32	20	-02	--	-14	-15	-05	12	--	06	--

TABLE 13 CONTINUED

Variable	Residual Factors Quarter 1	4	5
1. Visibility	-14	11	05
2. Sea Level Pressure	-17	-28	07
3. Dew Point Temp.	21	10	-00
4. Wind Speed	06	76	-84
5. Station Pressure	-17	-29	06
6. Dry Bulb Temp.	08	01	-20
7. Wet Bulb Temp.	15	07	-11
8. Relative Humidity	53	18	36
9. Total Sky Cover	71	-07	-36
10. Precip., No. Hrs.	16	-11	-02
11. Fog, No. Hrs.	11	-11	02
12. Precip., Dichot.	48	17	-03
13. Fog, Dichotomous	02	11	02
14. Day No.	-06	03	05
99. Assist	21	20	17

coefficients of congruence among the members of the factor all exceed .95, indicating a very definite match of factors across all time periods. Most important, the criterion takes very substantial loadings on the factor in all time periods and consistently in the same direction. In fact, the multiple correlations based only on this first factor would be significant or nearly significant for all time periods.

Factor B, absence of precipitation-fog, presents another clear match across time periods. Although the factor does not appear for the third quarter of the day, coefficients of congruence among the other time periods all exceed .95. The criterion takes a loading reversed in sign in the second quarter, but the loading of .02 is so low as to be highly susceptible to rotational variations.

Factor C, composed primarily of pressure, wind speed, and total sky cover, appears in the first, second, and fourth quarters of the day. Coefficients of congruence among the components of this factor all exceed .90, indicating a match, but the first time period is reversed with respect to the other time periods.

The residual factors are noteworthy for several reasons. First, the criterion variable takes substantial loadings on all three residual factors. Second, the factors for the fourth quarter and the total day are primarily defined by the variable Wind speed, and the residual factor for the first quarter is primarily defined by Total sky cover. It appears possible that a slightly different rotation might have collapsed the residual factors into Factor C to produce a rather strong third factor.

Accidents Combined. Variable (41) Accidents Combined (see Table 14) has multiple correlations almost as substantial as those for Assist, but the factor pattern is not so clear as for Assist.

Factor A, which does not appear for the primarily night-time first quarter of the day, is essentially high precipitation-fog. Coefficients of congruence among components of the factor range upward from .92, indicating a definite match across time periods. Loadings of the criterion are quite substantial and in the same direction for all time periods.

Factor B is composed of high temperature and low pressure and appears for all five time periods. Coefficients of congruence among the components range from .88 to .99, indicating that this is definitely the same factor for all time periods. For the second quarter of the day, the factor is reversed with respect to the other time periods, but the loading of the criterion for the second quarter is only .03. It is notable that only in the first quarter does the criterion take a noticeable loading on this factor.

Factor C appears only for the first, second, and fourth quarters of the day, and the first quarter appears to be only a marginal fit. The factor is mainly high precipitation, but low pressure and high wind also load in the first quarter. Coefficients of congruence between the first quarter and the other two are .70 and .71, but the coefficient between the second and fourth quarter is .99. Like Factor A, this factor is loaded rather substantially by the criterion in all the time periods in which it appears, and the loadings of the criterion are all in the same direction.

TABLE 14

Varimax Factors from Criterion Variable 41, Accidents Combined, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	--	-87	-90	-33	-87	-12	06	12	03	-02	12	-25	--	37	--
2. Sea Level Pressure	--	-23	-15	-00	-12	-48	60	-30	-25	-80	57	-15	--	12	--
3. Dew Point Temp.	--	20	27	13	11	83	-93	91	91	84	-23	13	--	-10	--
4. Wind Speed	--	-01	-15	03	04	-14	-22	-16	12	08	-67	-10	--	08	--
5. Station Pressure	--	-24	-16	-00	-12	-46	56	-25	-20	-78	58	-15	--	13	--
6. Dry Bulb Temp.	--	01	-18	-12	-08	71	-95	93	93	79	-21	00	--	07	--
7. Wet Bulb Temp.	--	12	06	01	02	77	-95	96	94	84	-22	07	--	-02	--
8. Relative Humidity	--	63	82	60	45	78	-27	18	23	24	-16	41	--	-40	--
9. Total Sky Cover	--	47	62	45	55	14	-30	18	15	21	-72	30	--	-38	--
10. Precip., No. Hrs.	--	49	89	34	86	08	00	-07	-04	04	-68	78	--	-86	--
11. Fog, No. Hrs.	--	88	85	84	80	09	-03	-11	-12	-05	03	17	--	-11	--
12. Precip., Dichot.	--	37	81	26	80	17	-07	08	02	12	-66	87	--	-86	--
13. Fog, Dichotomous	--	91	85	83	80	15	-04	-08	-12	-01	02	14	--	-18	--
14. Day No.	--	-16	-08	-17	-17	66	-84	92	91	60	02	01	--	-00	--
99. Accidents Combined	--	27	44	21	32	24	03	01	07	08	-19	32	--	-36	--

TABLE 14 CONTINUED

Variable	Factor D Quarter 1	2	3	4	5	Residual Factors Quarter 1	2	3	4	5
1. Visibility	--	--	-02	-05	12	36	08	04	-14	-14
2. Sea Level Pressure	--	--	89	93	06	19	01	06	-02	-11
3. Dew Point Temp.	--	--	-22	-34	-26	-36	-05	01	03	-35
4. Wind Speed	--	--	-62	-54	10	-41	-04	10	-09	-62
5. Station Pressure	--	--	91	94	06	17	01	06	-03	-14
6. Dry Bulb Temp.	--	--	-08	-22	15	-44	-01	-05	-06	-48
7. Wet Bulb Temp.	--	--	-16	-29	-06	-40	-04	-01	-01	-43
8. Relative Humidity	--	--	-23	-35	-77	11	-13	12	19	19
9. Total Sky Cover	--	--	-09	-15	-27	-19	-31	-04	-47	-20
10. Precip., No. Hrs.	--	--	01	06	09	15	30	35	00	-02
11. Fog, No. Hrs.	--	--	04	03	-18	-44	-03	-21	-17	04
12. Precip., Dichot.	--	--	01	-13	00	14	-23	40	-11	-10
13. Fog, Dichotomous	--	--	04	-03	-19	-38	14	-38	-11	07
14. Day No.	--	--	08	-00	-16	-27	00	08	-01	-53
99. Accidents Combined	--	--	09	04	36	16	27	29	29	-13

Factor D appears only for the third and fourth quarters of the day, but the coefficient of congruence between these two time periods is .98. The factor is composed of high pressure and low wind speed, which also show up on Factor C for the first quarter of the day. Not surprisingly, the latter has coefficients of congruence with the two components of Factor D of .68 and .71, so that the first quarter of Factor C would fit almost as well with Factor D as with Factor C.

The six residual factors are notable mainly for the fact that they tend to be loaded rather heavily by the criterion. They are rather heterogeneous also, having little in common with each other. The occurrence of accidents, though, tends to vary for the different parts of the day, as might also the types of accidents which occur. The first quarter of the day might be expected to be most dissimilar to the other time periods because traffic is much lighter then, and a large proportion of the traffic would be long-distance driving. The results do in fact show quite notable differences between the first and other quarters of the day. Factor A appears for all time periods but the first quarter. Factor B takes an appreciable loading only in the first quarter. Factors C and D appear for the first quarter in the form of a factor which is a combination of the Factors C and D, rather than as separate factors.

Drunks Combined. Variable (43) Drunks Combined (see Table 15) produced two consistent factors and one marginal factor.

Factor A, a combination of high temperature and low pressure, occurs for all five time periods, but is reversed in direction for the fourth quarter

TABLE 15

Varimax Factors from Criterion Variable 43, Drunks Combined, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	-04	-07	05	-08	04	81	87	-88	-79	-86	-43	--	--	37	--
2. Sea Level Pressure	-86	-58	-33	72	-79	21	30	-11	-06	-12	01	--	--	13	--
3. Dew Point Temp.	84	94	90	-90	80	30	-21	20	09	16	33	--	--	-04	--
4. Wind Speed	48	13	-22	-21	40	-10	-02	-19	-20	-18	-07	--	--	-07	--
5. Station Pressure	-84	-54	-28	68	-76	25	30	-12	-07	-12	02	--	--	14	--
6. Dry Bulb Temp.	81	95	95	-91	86	41	00	-19	-13	-03	26	--	--	09	--
7. Wet Bulb Temp.	83	95	96	-92	86	36	-12	02	-01	07	30	--	--	01	--
8. Relative Humidity	47	30	13	-26	02	-27	-74	72	54	46	44	--	--	-31	--
9. Total Sky Cover	36	30	04	-09	21	-17	-59	43	29	52	54	--	--	-47	--
10. Precip., No. Hrs.	-01	03	-06	04	-02	-26	-79	95	31	78	80	--	--	-91	--
11. Fog, No. Hrs.	03	02	-03	04	-03	-79	-85	88	92	85	32	--	--	-12	--
12. Precip., Dichot.	03	16	04	-00	08	-27	-74	82	22	74	84	--	--	-82	--
13. Fog, Dichotomous	05	02	-01	04	-02	-78	-86	82	88	83	33	--	--	-18	--
14. Day No.	52	85	90	-77	62	53	16	-06	-15	-14	21	--	--	09	--
99. Drunks Combined	10	24	04	07	15	12	01	11	30	05	06	--	--	14	--

TABLE 15 CONTINUED

Variable	Residual Factors Quarter					
	3	1	2	3	4	5
1. Visibility	07	05	03	-21	-11	09
2. Sea Level Pressure	-86	-05	02	-06	-35	-05
3. Dew Point Temp.	23	-07	-05	22	22	-50
4. Wind Speed	66	-19	-63	09	68	07
5. Station Pressure	-87	-06	01	-06	-35	-08
6. Dry Bulb Temp.	05	-07	-11	-05	-02	-14
7. Wet Bulb Temp.	15	-07	-09	10	12	-34
8. Relative Humidity	28	-04	19	43	52	-72
9. Total Sky Cover	17	03	-16	74	50	-32
10. Precip., No. Hrs.	06	-02	26	-03	-02	-17
11. Fog, No. Hrs.	-08	07	-15	03	-13	06
12. Precip., Dichot.	11	-04	44	09	30	-21
13. Fog, Dichotomous	-10	03	-19	22	-00	01
14. Day No.	-03	-46	00	-12	-08	-49
99. Drunks Combined	15	20	18	23	10	15

of the day. Coefficients of congruence among components of this factor range from .82 to .98. The only coefficients less than .90 were two of the four involving the third quarter of the day. The decreased coefficients for the third quarter are the result of the relatively low loadings of the two pressure variables, which define a separate factor only for this one time period.

Factor B is essentially high precipitation-fog, and also appears for all five time periods. The factor is reversed for the first quarter of the day, and this time period has coefficients of congruence with the other four time periods ranging only from .78 to .87. The other four time periods, on the other hand, all have coefficients with one another above .90. The lower coefficients for the first quarter are apparently due to the low loadings of Relative humidity, Total sky cover, and the two precipitation variables. The fourth quarter also has only moderate loadings on these variables, but the loadings are high enough that the factor can still be identified as certainly the same.

Factor C occurs only for the first and fourth quarters of the day and is defined by the four variables which had lower loadings on Factor B than in the other time periods. It is uncertain whether a slightly different rotation might have collapsed Factors B and C together, but this appears to be a possibility. Interpretation is further complicated by the fact that the second and fourth time periods are in opposite directions on all three of the Factors A, B, and C.

The six residual factors are of little interest except that, taken together, they account for 75 per cent as much variance in the criterion as the three consistent factors. It appears rather unlikely that the distributions of either frequency or type of drunks would show so much variability that a completely different pattern of predictors would appear for each quarter. It appears somewhat more likely that the rotational method distorted the true pattern, possibly caused in part by a considerable amount of error of measurement in the criterion.

DISCUSSION

One of the most striking results of this study is that essentially the same three factors appeared in the analysis of almost every one of the nine selected criterion variables. Moreover, these three factors appeared consistently in at least several of the time periods for each of these criterion variables. The most prominent factor is temperature-pressure, which appeared as a major component of all of the nine criterion variables. For all criteria except Fire Call, a high rate of police calls is associated with high temperature and low atmospheric pressure. It appears probable that pressure occurs with temperature mainly because these two variables constitute a common weather pattern. Since temperature is generally rather highly correlated with the day of the six-month period, however, it is difficult to say whether temperature per se is a causal factor or whether the police calls are caused by some other variable or variables associated with either temperature or seasonal changes. For example, burglaries of

residences might be expected to increase during June because more people move or are on vacation during June than earlier in the year. Crimes of violence might be expected to increase toward the later part of the six-month period because people are more likely to be in public places during warmer weather. In the latter case, one might expect a possible negative relationship between temperature and violent crimes during the summer, as temperatures become oppressive, and possibly reversed trends for day and night periods.

Generally, the loadings of the three temperature variables were at least equal to and often exceeded those of the time variable on the temperature-time factor. Whether this is an indication that temperature is the leading predictor, or whether the redundancy of the three temperature variables "pulled" the factor rotation toward the temperature variables, could only be determined by a rather extensive reanalysis of the data.

Variable (30) Fire Call is the only criterion variable which is negatively correlated with the temperature-pressure factor. The most likely explanation of this is that fires involving heating equipment are normally most common during cold weather, thereby reversing the more common relationship between criterion variables and the temperature-pressure factor.

The second most prominent factor is the one composed of Precipitation, Fog, Visibility, Relative Humidity, and Total sky cover, which has heretofore been described as precipitation-fog. Accidents Combined and Drunks Combined are both positively correlated with presence of Precipitation, Fog, Humidity, and Total sky cover, and negatively with Visibility. For Accidents

Combined, the relationship with precipitation-fog is obvious and needs little further comment, although the variations by time periods are most interesting. For Drunks Combined, on the other hand, the rationale for the positive correlation with precipitation-fog is rather puzzling, especially in view of the fact that Drunks Combined is negatively correlated with a precipitation-alone factor.

The Fire Call variable is positively correlated with the precipitation-fog factor in two of the four time periods in which it occurs. Since fire calls normally go to the fire department rather than the police, it is suggested that perhaps the police become involved in bad weather because of attendant traffic control or accident problems.

For all the other criterion variables, the absence of precipitation-fog is associated with high frequencies of police calls. All of these criterion variables except Assist involve primarily persons rather than property. It would seem likely, then, that the number of incidents in these categories would tend to increase during fair weather, when people are more likely to be found in public places. Assist is a miscellaneous category including all requests for police assistance which do not fit easily into one of the specific categories. Consequently, the Assist category might be interpreted as a measure of the general level of police activity rather than of any specific type of activity; this makes specific conclusions difficult.

The third common factor is a combination of high wind and low atmospheric pressure and occurs as a consistent factor for eight of the nine

criterion categories of police calls. Since pressure is substantially correlated with temperature (about .5) and usually appears with temperature on another factor, it is somewhat surprising that pressure should so consistently define another factor. Wind speed is one of the few predictor variables used in the study which does not have a near-duplicate variable among the predictors; hence it may be deemphasized relative to such duplicated variables as temperature, pressure, precipitation, and fog. It therefore appears probable that, if the duplicated variables were deleted from the matrix of predictor variables, this pressure-wind factor might come out relatively stronger. The factor is negatively correlated with Disturbance and Domestic Disturbance, and positively correlated with all the remaining criterion variables except Drunks Combined, for which it did not appear at all. Explanation of the relationships between the pressure-wind factor and the criterion variables is rather difficult. Assault and Fight appear to be of the nature of exaggerations of Disturbance, but the latter is correlated in the opposite direction from the former two variables. Furthermore, Accidents Combined is positively correlated with the high pressure-low wind factor, and no simple rationale for this relationship is apparent. Further study, over a longer period than the six-month, January to June, period used in the present investigation, including a northern city as well as the southwestern city studied here, may help to clarify the meaning of relational patterns such as those described.

A fourth factor appeared for three of the criterion categories. This factor, principally precipitation alone, is positively correlated with Accidents

Combined and negatively correlated with Domestic Disturbance. This factor appeared for two time periods of Drunks Combined, but was positively correlated with this criterion in one time period and negatively in the other. For Accidents Combined, the results indicate that precipitation by itself, as well as precipitation with fog, is associated with an increase in accidents. Similarly, for Domestic Disturbance, both precipitation and precipitation-fog appear to be related to a decrease in police calls. The complete reversal of relationships between factors and the variable Drunks Combined, from the fourth to the first quarter of the day, requires further study.

Although the results show many impressive consistencies across criterion variables and time periods, the number of inconsistencies observed require that a cautious attitude be taken in dealing with them. In a number of cases, a clear factor appeared in most or all of the time periods, but was reversed in some of the periods relative to the others. It is suspected that most of the apparent reversals may be possible effects of rotational vagaries. Another problem, that many factors which are neither consistent across time periods nor readily interpretable account for a major share of the multiple correlation, appears to be similarly caused by rotation. The considerable variability of loadings of the criterion on a factor in the different time periods may be the result of errors of measurement and sampling or of rotational problems, or a combination of the two. The inclusion of near-duplicate predictor variables (such as the three temperature variables) would tend to orient both the original and rotated factors more strongly toward the duplicated variables than might otherwise be the case. This would tend to

give undue prominence to such factors as temperature-pressure and precipitation-fog, and to suppress such factors as pressure-wind, as well as factors which might cut across several of the obtained factors. Therefore, until the present type of data can be reanalyzed with duplicate predictor variables removed, over longer periods of time, and for samples from other geographic areas, the consistency of the results must be treated with caution.

The results as a whole, however, appear very promising. The estimated multiple correlations as a whole are well above the chance level, and these would not be very susceptible to the effects of duplicated predictor variables. In fact, the principal result of the duplicated variables on the multiple correlations would be to add only slightly to the multiple correlations, but to decrease spuriously the degrees of freedom, resulting in extremely conservative estimates of significance.

Most important, the multiple correlations tend to be highest for those categories of police calls which have the highest frequencies. This result suggests not only that there are definite relationships between frequencies of police calls and weather patterns, but that poor results for many categories of police calls may be primarily the result of lack of sufficient data.

The present study was limited to a time period of only six months and a geographical area of only one North Texas city. Since two entire seasons of the year, including the extreme hot weather conditions of the summer, were omitted from the time sample, the magnitude of the multiple correlations becomes even more impressive.

It must be noted that the present report analyzed only relationships between weather patterns and police calls occurring at approximately the same time. In order to keep the study to a manageable size, the analysis of other possible types of relationships had to be deferred. It is quite possible that weather patterns during one time period may affect frequencies of police calls at a later time. Changes in the weather rather than the weather itself may also be determiners of increases or decreases in police activity. Likewise, deviations from the seasonal norms of weather might affect frequencies of police calls. Study of these and other possible types of relationships might well improve the prediction of police calls from weather patterns beyond the results reported here. More important, study of various types of relationships might vastly improve psychological interpretation of the relationships between weather and behavior, especially with regard to the identification of variables intervening between weather patterns and antisocial behaviors. Since weather is rather difficult to alter, intervening variables present the most reasonable point at which to affect the occurrence of criminal behavior.

It must be recognized that weather patterns are not the sole or even major determiners of crime or other activities which place demands on the police. At the same time, their importance, not only for accidents, but for the general level of police activity, appears to be significant. It is rather notable, therefore, that the results of the present study, with all of the limitations mentioned, are as strong and consistent as reported.

Given hindsight, a number of improvements over the procedures employed here are indicated for future studies of these and related data. Redundant variables, such as the three measures of temperature plus the day of the year, should be minimized, either by deleting the redundant variables or by using part correlations with variance common to another highly-correlated variable partialled out. An exact measure of precipitation would be considerably superior to the crude measures used here. Visibility can probably be used as a fairly exact measure of fog/haze. Police call categories should be combined or omitted for those categories with very small mean frequencies of occurrence. In this regard, preliminary Criterion Factorizations could be made to determine which categories of police calls are sufficiently similar to warrant combination. Furthermore, it may be feasible to divide the day into shorter time periods in order to reduce the randomness engendered by averaging dissimilar patterns within a time period. Finally, with a better understanding of the effects of rotation on Crifac factors, especially with regard to factor matching, it may be possible to clarify patterns of relationships which at present are rather unclear.

The vast number of possibilities as yet unstudied leaves a whole field of investigation open. More complex studies may well improve the ability to predict and interpret patterns of police calls from weather patterns. More important, expanded studies, using individual rather than population measures, would be even more valuable in attempting to explain the intervening variables in the police-weather relationships. Such studies may

illuminate the diverse indirect influences of weather on many behaviors as well as direct effects of weather on the human organism. They may throw new light on changes in the environment, as effects of weather variations, that act on individuals to induce criminal behavior. These and many other questions need to be answered, and they can only be answered by further research in this promising area.

REFERENCES

Demaree, R.G. Prediction and factorization of a single variable. Paper presented at the annual meeting of the Society of Multivariate Experimental Psychologists, Berkeley, California, November 16 - 18, 1967. Published by Institute of Behavioral Research, Texas Christian University, Fort Worth, Texas 76129.

Demaree, R.G., & Willis, D.S. Criterion factorization: equations, computational procedures, and computer program. RSA Contract No. RH-2, 1968. Institute of Behavioral Research, Texas Christian University, Fort Worth, Texas 76129.

Findikyan, N., & Sells, S.B. Some relations of meteorological variables to day-to-day fluctuations in subjective feeling. Research Note No. 1, Contract Nonr 3436(00), 1964. Institute of Behavioral Research, Texas Christian University, Fort Worth, Texas 76129

Muecher, H., & Ungeheuer, H. Meteorological influence on reaction time, flicker fusion frequency, job accidents, and use of medical treatment. Perceptual and Motor Skills, 12, 163-168, 1961.

Sells, S.B. (Ed.) Symposium on dimensions of stimulus situations which account for behavior variance. Technical Report No. 1, Contract Nonr 3436(00), 1961. Institute of Behavioral Research, Texas Christian University, Fort Worth, Texas 76129.

Sells, S.B. Stimulus determinants of behavior. New York: Ronald Press, 1963.

APPENDICES 1 - 9

UNROTATED FACTOR MATRICES

APPENDIX 1

Unrotated Factors from Criterion Variable 17, Assault, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	-02	-57	--	26	34	75	-76	76	-73	--	--	07	--	20	--
2. Sea Level Pressure	-76	08	--	-52	-42	01	-22	51	07	--	--	90	--	82	--
3. Dew Point Temp.	91	-47	--	91	82	-19	74	-49	34	--	--	-24	--	-15	--
4. Wind Speed	50	-16	--	27	22	45	02	01	-03	--	--	-07	--	-45	--
5. Station Pressure	-73	05	--	-48	-38	00	-19	51	08	--	--	91	--	84	--
6. Dry Bulb Temp.	87	-64	--	96	92	-11	61	-02	06	--	--	-13	--	05	--
7. Wet Bulb Temp.	90	-56	--	95	90	-15	70	-29	22	--	--	-18	--	-05	--
8. Relative Humidity	52	34	--	17	-05	-38	64	-88	68	--	--	-41	--	-45	--
9. Total Sky Cover	52	02	--	07	01	-05	62	-72	63	--	--	-14	--	-27	--
10. Precip., No. Hrs.	27	33	--	-18	-25	-06	62	-79	80	--	--	-15	--	-16	--
11. Fog, No. Hrs.	-05	27	--	-31	-35	-81	69	-59	55	--	--	-14	--	-27	--
12. Precip., Dichot.	30	26	--	-04	-15	-21	60	-78	71	--	--	-31	--	-31	--
13. Fog, Dichotomous	-02	40	--	-30	-33	-80	70	-69	54	--	--	-12	--	-37	--
14. Day No.	65	-69	--	87	86	-10	49	-05	06	--	--	03	--	21	--
99. Assault	17	10	--	27	14	07	16	17	05	--	--	17	--	11	--

APPENDIX 1 CONTINUED

Variable	Residual Factors Quarter					
	1	2	3	1	2	3
1. Visibility	-56	-04	-36	09	10	11
2. Sea Level Pressure	-05	-08	39	27	-32	-47
3. Dew Point Temp.	-21	32	19	22	15	01
4. Wind Speed	29	-39	-08	-18	75	86
5. Station Pressure	-07	-06	41	29	-32	-48
6. Dry Bulb Temp.	-34	39	24	17	12	-04
7. Wet Bulb Temp.	-28	34	23	19	14	-01
8. Relative Humidity	38	-08	02	26	11	07
9. Total Sky Cover	36	-44	-30	-45	37	-20
10. Precip., No. Hrs.	79	-32	27	-13	-20	-09
11. Fog, No. Hrs.	44	-28	46	-06	-40	-10
12. Precip., Dichot.	61	-29	13	-43	-11	-10
13. Fog, Dichotomous	43	-12	42	-07	-32	-10
14. Day No.	-42	41	33	36	05	-10
99. Assault	06	11	14	07	14	08

APPENDIX 2

Unrotated Factors from Criterion Variable 20, Demented Person, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	41	-34	11	37	53	-75	74	-89	-76	--	30	--	16	12	--
2. Sea Level Pressure	-59	21	-66	-58	-36	-50	64	-05	-42	--	23	--	50	28	--
3. Dew Point Temp.	81	-44	79	80	58	19	-62	14	32	--	-44	--	-31	-38	--
4. Wind Speed	32	-45	-01	27	15	15	-20	-27	15	--	-25	--	-62	-32	--
5. Station Pressure	-55	19	-64	-54	-32	-51	63	-05	-42	--	22	--	49	28	--
6. Dry Bulb Temp.	85	-49	65	92	81	06	-41	-29	14	--	-40	--	-19	-09	--
7. Wet Bulb Temp.	83	-46	76	88	71	12	-53	-05	23	--	-43	--	-28	-26	--
8. Relative Humidity	22	05	36	-00	-34	57	-82	77	50	--	-36	--	-27	-68	--
9. Total Sky Cover	09	-29	26	-17	-30	36	-73	56	23	--	-58	--	-26	-87	--
10. Precip., No. Hrs.	-34	45	-18	-33	-52	16	-67	84	72	--	-84	--	-38	-24	--
11. Fog, No. Hrs.	-39	42	-01	-35	-46	77	-57	88	68	--	-15	--	-00	09	--
12. Precip., Dichot.	-31	32	-09	-20	-44	17	-73	71	66	--	-88	--	-50	-41	--
13. Fog, Dichotomous	-36	45	06	-34	-46	78	-68	88	71	--	-15	--	05	01	--
14. Day No.	73	-59	53	82	71	-14	-22	-20	07	--	-30	--	-20	-03	--
99. Demented Person	19	09	07	28	14	06	18	11	08	--	10	--	12	17	--

APPENDIX 2 CONTINUED

Variable	Residual Factors Quarter		
	2	5	2
1. Visibility	-09	-26	41
2. Sea Level Pressure	11	15	-58
3. Dew Point Temp.	60	-23	16
4. Wind Speed	-48	-35	30
5. Station Pressure	15	14	-58
6. Dry Bulb Temp.	71	-02	23
7. Wet Bulb Temp.	66	-14	19
8. Relative Humidity	-09	-36	-14
9. Total Sky Cover	-27	-59	-17
10. Precip., No. Hrs.	-00	00	-12
11. Fog, No. Hrs.	15	46	-34
12. Precip., Dichot.	-05	-16	-03
13. Fog, Dichotomous	17	43	-31
14. Day No.	71	-13	-01
99. Demented Person	10	0[illegible]	10

APPENDIX 3

Unrotated Factors from Criterion Variable 21, Disturbance, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	26	22	48	37	50	75	28	70	54	41	-37	-82	--	-52	-55
2. Sea Level Pressure	-59	-14	-54	-55	-48	60	85	52	73	25	26	00	--	27	-52
3. Dew Point Temp.	94	75	70	86	71	-15	-49	-57	-27	-34	18	39	--	41	50
4. Wind Speed	33	-04	02	30	17	-44	-55	-25	-12	-79	-46	-41	--	-22	-31
5. Station Pressure	-55	-10	-51	-51	-44	62	85	51	75	24	27	02	--	30	-51
6. Dry Bulb Temp.	95	88	87	93	83	-05	-35	-17	-01	-29	08	24	--	19	22
7. Wet Bulb Temp.	95	82	81	91	79	-10	-43	-40	-15	-34	13	33	--	32	38
8. Relative Humidity	36	-12	-11	09	-13	-46	-57	-78	-61	-17	42	60	--	59	64
9. Total Sky Cover	29	-09	-12	-00	-10	-51	-72	-57	-47	-61	32	16	--	52	38
10. Precip., No. Hrs.	-02	-31	-46	-30	-41	-59	-34	-75	-55	-32	36	65	--	41	63
11. Fog, No. Hrs.	-29	-22	-45	-39	-48	-65	-25	-66	-41	-31	38	75	--	47	55
12. Precip., Dichot.	03	-25	-30	-14	-29	-54	-47	-69	-64	-34	61	58	--	36	67
13. Fog, Dichotomous	-26	-22	-42	-37	-47	-67	-23	-63	-48	-32	35	80	--	49	57
14. Day No.	82	90	72	84	76	22	-14	-27	12	-15	13	18	--	27	16
99. Disturbance	30	28	15	40	28	09	09	04	07	11	11	07	--	06	06

APPENDIX 3 CONTINUED

Variable	Residual Factors Quarter		
	1	2	3
1. Visibility	32	11	-26
2. Sea Level Pressure	-31	-28	-41
3. Dew Point Temp.	-15	-03	-02
4. Wind Speed	20	12	-49
5. Station Pressure	-32	-29	-43
6. Dry Bulb Temp.	-16	-10	-18
7. Wet Bulb Temp.	-15	-07	-10
8. Relative Humidity	-05	17	26
9. Total Sky Cover	33	-46	06
10. Precip., No. Hrs.	-20	-13	15
11. Fog, No. Hrs.	-24	-35	25
12. Precip., Dichot.	12	-03	11
13. Fog, Dichotomous	-30	-20	29
14. Day No.	-37	-11	-36
99. Disturbance	11	11	13

APPENDIX 4

Unrotated Factors from Criterion Variable 22, Domestic Disturbance, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	27	-45	-00	51	62	70	--	-90	-63	--	--	13	18	--	--
2. Sea Level Pressure	-56	12	-89	-44	-42	69	--	-08	-35	--	--	28	30	--	--
3. Dew Point Temp.	93	-36	76	71	54	-20	--	05	48	--	--	43	21	--	--
4. Wind Speed	40	-42	34	25	22	-07	--	-13	31	--	--	-33	-30	--	--
5. Station Pressure	-52	09	-87	-40	-39	70	--	-09	-33	--	--	31	32	--	--
6. Dry Bulb Temp.	94	-57	66	88	75	-10	--	-26	30	--	--	46	48	--	--
7. Wet Bulb Temp.	94	-47	74	81	66	-14	--	-08	40	--	--	44	35	--	--
8. Relative Humidity	35	50	32	-12	-31	-45	--	58	54	--	--	04	-36	--	--
9. Total Sky Cover	34	-09	15	-22	-24	-23	--	18	35	--	--	-30	-57	--	--
10. Precip., No. Hrs.	00	22	-01	-49	-53	-41	--	72	40	--	--	-34	-39	--	--
11. Fog, No. Hrs.	-32	43	-00	-44	-57	-65	--	84	76	--	--	-09	-22	--	--
12. Precip., Dichot.	05	17	06	-35	-43	-39	--	51	49	--	--	-36	-43	--	--
13. Fog, Dichotomous	-29	41	01	-45	-57	-67	--	80	72	--	--	-16	-26	--	--
14. Day No.	79	-59	49	80	65	07	--	-33	25	--	--	57	29	--	--
99. Domestic Disturbance	25	08	10	30	20	12	--	05	11	--	--	07	07	--	--

Variable	Residual Factors Quarter						
	1	2	3	4	5	4	4
1. Visibility	-51	32	23	13	00	38	07
2. Sea Level Pressure	20	-70	-20	56	-24	-11	30
3. Dew Point Temp.	13	12	-58	-37	-29	-25	13
4. Wind Speed	19	27	44	-24	-28	64	-44
5. Station Pressure	20	-71	-23	57	-26	-13	32
6. Dry Bulb Temp.	02	06	-41	-12	-12	-22	07
7. Wet Bulb Temp.	08	08	-53	-26	-23	-23	11
8. Relative Humidity	46	19	-40	-59	-32	-18	15
9. Total Sky Cover	63	-05	-51	-62	-54	-02	16
10. Precip., No. Hrs.	53	-43	-39	-46	-02	-18	08
11. Fog, No. Hrs.	44	-38	-21	24	23	-22	04
12. Precip., Dichot.	64	-25	-51	-54	-07	13	26
13. Fog, Dichotomous	42	-39	-23	10	14	-29	-18
14. Day No.	-11	-03	-64	-00	-30	-24	26
99. Domestic Disturbance	10	11	07	15	12	13	11

APPENDIX 5

Unrotated Factors from Criterion Variable 29, Fight, by Time Periods

	Factor A Quarter					Factor B Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	64	14	05	59	57	-45	76	-91	-58	-76
2. Sea Level Pressure	-35	-38	-69	-46	-42	-24	68	-04	-44	-62
3. Dew Point Temp.	72	86	71	58	61	40	-43	21	62	59
4. Wind Speed	27	21	-07	40	14	16	00	-31	42	15
5. Station Pressure	-31	-34	-67	-43	-33	-24	68	-04	-43	-61
6. Dry Bulb Temp.	77	94	78	76	79	21	-20	-16	40	38
7. Wet Bulb Temp.	75	91	77	69	72	30	-32	04	53	51
8. Relative Humidity	11	03	07	-23	-24	84	-83	72	68	52
9. Total Sky Cover	08	15	-00	-31	-22	66	-60	49	53	58
10. Precip., No. Hrs.	-30	-19	-14	-56	-43	48	-65	87	60	69
11. Fog, No. Hrs.	-65	-14	09	-48	-51	37	-65	90	54	54
12. Precip., Dichot.	-26	-10	-16	-41	-39	62	-72	74	63	70
13. Fog, Dichotomous	-62	-15	06	-46	-51	36	-67	88	64	53
14. Day No.	72	89	55	67	71	03	-02	-08	30	17
99. Fight	19	21	08	14	12	11	06	25	04	05

APPENDIX 5 CONTINUED

Variable	Residual Factors Quarter						
	1	2	3	4	5	3	5
1. Visibility	50	-37	06	00	09	-04	59
2. Sea Level Pressure	68	45	59	18	03	-24	13
3. Dew Point Temp.	-47	18	-29	-44	-24	-54	-31
4. Wind Speed	-28	17	-67	35	-64	18	31
5. Station Pressure	67	47	59	17	01	-28	11
6. Dry Bulb Temp.	-49	16	03	-32	-15	-54	-17
7. Wet Bulb Temp.	-48	19	-14	-40	-21	-57	-24
8. Relative Humidity	-16	11	-53	-38	-17	-13	-35
9. Total Sky Cover	-20	24	-55	-42	-59	-00	07
10. Precip., No. Hrs.	-30	48	-23	-17	-06	-06	-00
11. Fog, No. Hrs.	-46	52	10	30	18	20	-37
12. Precip., Dichot.	-26	29	-41	-25	-17	-23	-02
13. Fog, Dichotomous	-49	50	04	34	13	13	-43
14. Day No.	-32	11	00	-35	-20	-76	-37
99. Fight	13	08	16	13	11	08	07

APPENDIX 6

Unrotated Factors from Criterion Variable 31, Fire Call, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	-35	04	33	34	26	62	-90	-67	--	-52	-55	--	48	--	63
2. Sea Level Pressure	-63	65	66	73	68	21	-19	13	--	-13	40	--	01	--	-08
3. Dew Point Temp.	45	-92	-93	-90	-95	-34	27	-08	--	-14	-76	--	25	--	10
4. Wind Speed	28	-28	06	-25	-17	-19	-19	39	--	44	-28	--	55	--	42
5. Station Pressure	-63	61	63	71	65	20	-18	13	--	-14	36	--	03	--	-06
6. Dry Bulb Temp.	35	-92	-67	-70	-79	-29	05	-35	--	-11	-83	--	56	--	50
7. Wet Bulb Temp.	40	-93	-84	-82	-90	-32	17	-20	--	-12	-80	--	42	--	30
8. Relative Humidity	58	-29	-63	-68	-47	-34	74	45	--	-02	-07	--	-42	--	-73
9. Total Sky Cover	36	-34	-45	-46	-46	-65	52	42	--	28	-06	--	-25	--	-42
10. Precip., No. Hrs.	81	01	-36	-32	-23	-01	83	72	--	75	39	--	-41	--	-31
11. Fog, No. Hrs.	19	-03	-32	-24	-21	-66	82	58	--	48	53	--	-51	--	-59
12. Precip., Dichot.	71	-11	-43	-44	-34	-25	77	66	--	65	34	--	-28	--	-35
13. Fog, Dichotomous	28	-02	-34	-29	-24	-56	85	54	--	48	51	--	-54	--	-59
14. Day No.	21	-80	-65	-59	-71	-04	-05	-31	--	-33	-76	--	41	--	32
99. Fire Call	12	29	23	23	18	12	09	15	--	08	23	--	14	--	05

APPENDIX 6 CONTINUED

Variable	Residual Factors Quarter				
	1	2	3	4	2
1. Visibility	-29	-03	-28	11	-02
2. Sea Level Pressure	10	35	14	02	-48
3. Dew Point Temp.	21	13	01	08	-18
4. Wind Speed	-33	-58	-50	89	39
5. Station Pressure	11	37	14	03	-50
6. Dry Bulb Temp.	16	19	21	11	-27
7. Wet Bulb Temp.	18	15	11	11	-23
8. Relative Humidity	27	-09	-22	-06	19
9. Total Sky Cover	-46	-25	-36	23	17
10. Precip., No. Hrs.	-11	04	15	08	10
11. Fog, No. Hrs.	37	-29	19	-21	-31
12. Precip., Dichot.	-34	-09	02	13	04
13. Fog, Dichotomous	46	-14	09	-19	-16
14. Day No.	23	39	-07	04	-25
99. Fire Call	09	13	11	12	11

APPENDIX 7

Unrotated Factors from Criterion Variable 40, Assist, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	22	-25	20	30	38	74	63	40	35	48	-43	-54	--	-73	-58
2. Sea Level Pressure	-60	-48	-51	-56	-53	59	49	73	68	35	33	26	--	07	-37
3. Dew Point Temp.	95	97	90	88	81	-12	-11	-17	-21	-30	19	-06	--	33	40
4. Wind Speed	34	01	00	30	15	-41	-55	-51	-36	-73	-43	-70	--	01	-42
5. Station Pressure	-56	-44	-47	-52	-49	61	51	75	70	35	34	26	--	09	-37
6. Dry Bulb Temp.	95	97	94	95	87	-02	12	22	06	-28	08	-11	--	15	02
7. Wet Bulb Temp.	96	98	96	94	86	-07	-00	00	-09	-31	14	-08	--	25	22
8. Relative Humidity	39	35	13	12	-00	-42	-73	-64	-63	-11	51	17	--	51	79
9. Total Sky Cover	30	30	08	-00	-01	-51	-72	-57	-64	-66	33	-24	--	27	30
10. Precip., No. Hrs.	-01	14	-17	-26	-30	-64	-65	-46	-51	-45	27	47	--	48	60
11. Fog, No. Hrs.	-26	24	-18	-31	-37	-64	-55	-32	-13	-38	42	61	--	75	58
12. Precip., Dichot.	04	21	-02	-11	-18	-61	-69	-45	-61	-47	47	33	--	45	61
13. Fog, Dichotomous	-23	24	-17	-29	-35	-66	-55	-32	-20	-39	37	63	--	80	59
14. Day No.	81	87	87	86	81	24	31	25	23	-02	15	-06	--	24	12
99. Assist	50	38	34	57	36	13	16	04	17	14	12	10	--	11	09

APPENDIX 7 CONTINUED

	Residual Factors Quarter	
	1	4
1. Visibility	29	24
2. Sea Level Pressure	-21	-09
3. Dew Point Temp.	-14	-13
4. Wind Speed	27	68
5. Station Pressure	-22	-10
6. Dry Bulb Temp.	-19	-16
7. Wet Bulb Temp.	-16	-14
8. Relative Humidity	08	-02
9. Total Sky Cover	47	-22
10. Precip., No. Hrs.	-16	-24
11. Fog, No. Hrs.	-29	-20
12. Precip., Dichot.	09	02
13. Fog, Dichotomous	-38	01
14. Day No.	-35	-11
99. Assist	10	12

APPENDIX 8

Unrotated Factors from Criterion Variable 41, Accidents Combined, by Time Periods

Variable	Factor A Quarter					Factor B Quarter					Factor C Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	--	-66	-89	-83	-75	-24	02	02	-09	08	--	28	19	23	43
2. Sea Level Pressure	--	-36	-14	-26	-38	-76	54	87	68	44	--	-14	-31	-45	-51
3. Dew Point Temp.	--	36	29	34	51	84	-87	-38	-45	-45	--	20	74	73	63
4. Wind Speed	--	-03	-15	06	22	40	-25	-44	-50	27	--	-01	03	14	28
5. Station Pressure	--	-35	-14	-26	-37	-74	50	87	67	43	--	-13	-28	-41	-48
6. Dry Bulb Temp.	--	14	-16	02	34	75	-90	-28	-42	-06	--	25	72	75	86
7. Wet Bulb Temp.	--	26	09	20	45	80	-89	-34	-44	-27	--	22	77	76	76
8. Relative Humidity	--	79	82	78	44	67	-19	-22	-18	-76	--	-04	18	18	-32
9. Total Sky Cover	--	60	62	62	62	60	-28	-17	-27	-18	--	-12	08	-13	-09
10. Precip., No. Hrs.	--	84	92	81	78	47	24	14	37	14	--	42	07	01	-29
11. Fog, No. Hrs.	--	81	83	64	68	13	-00	-08	-14	-07	--	-32	-28	-49	-45
12. Precip., Dichot.	--	81	84	79	79	52	08	13	17	06	--	26	24	09	-20
13. Fog, Dichotomous	--	83	82	69	69	17	00	-16	-14	-10	--	-26	-36	-43	-44
14. Day No.	--	-01	-05	01	20	52	-79	-07	-19	-23	--	32	77	74	66
99. Accidents Combined	--	39	47	40	35	28	16	19	24	33	--	21	13	16	09

APPENDIX 8 CONTINUED

Residual Factors

Variable	Quarter						
	1	3	4	1	2	4	5
1. Visibility	10	-00	-11	31	-10	-31	-18
2. Sea Level Pressure	12	-22	-35	01	-02	30	-25
3. Dew Point Temp.	30	-41	-26	-29	-00	21	-21
4. Wind Speed	-67	48	14	-16	02	-13	-45
5. Station Pressure	14	-25	-38	-00	-02	32	-27
6. Dry Bulb Temp.	21	-52	-40	-37	03	18	-16
7. Wet Bulb Temp.	25	-48	-34	-33	00	20	-20
8. Relative Humidity	43	06	20	13	-08	13	-08
9. Total Sky Cover	-45	-10	-33	04	-23	-17	-18
10. Precip., No. Hrs.	-37	23	-03	36	04	-26	15
11. Fog, No. Hrs.	-03	-12	-04	-43	18	28	05
12. Precip., Dichot.	-30	18	-05	34	-47	-41	05
13. Fog, Dichotomous	01	-24	03	-38	35	24	08
14. Day No.	39	-51	-48	-29	-02	20	-41
99. Accidents Combined	07	12	14	21	15	08	12

APPENDIX 9

Unrotated Factors from Criterion Variable 43, Drunks Combined, by Time Periods

Variable	Factor A Quarter					Factor B Quarter				
	1	2	3	4	Tot.	1	2	3	4	Tot.
1. Visibility	23	-37	-38	11	-08	79	74	-68	-86	-79
2. Sea Level Pressure	-62	-65	48	51	-79	53	09	-61	05	-04
3. Dew Point Temp.	94	95	-49	-70	85	-14	07	61	-10	-09
4. Wind Speed	36	09	-09	11	36	-32	-23	12	-17	-19
5. Station Pressure	-58	-61	46	48	-76	54	10	-61	03	-05
6. Dry Bulb Temp.	95	87	-72	-73	86	-02	24	16	-37	-17
7. Wet Bulb Temp.	95	93	-62	-72	88	-08	14	42	-23	-13
8. Relative Humidity	38	56	21	-18	15	-50	-47	87	56	21
9. Total Sky Cover	34	48	45	-04	31	-36	-48	69	40	35
10. Precip., No. Hrs.	05	32	19	-27	10	-33	-56	70	54	68
11. Fog, No. Hrs.	-27	31	25	-21	08	-73	-78	61	89	83
12. Precip., Dichot.	10	44	15	-14	21	-37	-41	71	44	62
13. Fog, Dichotomous	-24	31	36	-16	10	-73	-81	64	88	78
14. Day No.	78	74	-66	-64	63	10	40	17	-36	-36
99. Drunks Combined	14	24	07	08	15	10	13	25	27	07

APPENDIX 9 CONTINUED

Variable	Residual Factors Quarter							
	1	2	3	4	5	1	3	4
1. Visibility	-39	-27	42	13	35	12	18	-08
2. Sea Level Pressure	06	02	-50	07	-11	-34	08	-62
3. Dew Point Temp.	10	-15	-08	07	-42	-01	56	60
4. Wind Speed	-22	-59	67	-23	17	04	-25	67
5. Station Pressure	07	01	-51	08	-12	-35	11	-61
6. Dry Bulb Temp.	03	-29	-10	17	-01	-00	63	39
7. Wet Bulb Temp.	07	-23	-09	11	-23	-00	62	52
8. Relative Humidity	30	38	-05	-18	-81	-06	-00	59
9. Total Sky Cover	43	00	16	-42	-43	-10	25	47
10. Precip., No. Hrs.	67	52	-46	-74	-39	-38	-41	-10
11. Fog, No. Hrs.	36	16	-50	19	-18	02	-27	-07
12. Precip., Dichot.	68	64	-33	-74	-41	-40	-24	21
13. Fog, Dichotomous	35	13	-42	09	-24	-00	-12	03
14. Day No.	-18	-22	-25	16	-34	-40	54	26
99. Drunks Combined	14	12	13	20	14	13	07	09

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

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

1. ORIGINATING ACTIVITY (Corporate author)

Institute of Behavioral Research
Texas Christian University
Fort Worth, Texas 76129

2a. REPORT SECURITY CLASSIFICATION

UNCLASSIFIED

2b. GROUP

3. REPORT TITLE

Prediction of Police Incidents and Accidents by Meteorological Variables

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Technical Report January, 1964 - March, 1967

5. AUTHOR(S) (First name, middle initial, last name)

Donald P. Will, Jr. and S. B. Sells

6. REPORT DATE	7a. TOTAL NO OF PAGES	7b. NO OF REFS
March, 1969	88	6

8a. CONTRACT OR GRANT NO

Contract No. Nonr 3436(00)

b. PROJECT NO

c.

d

9a. ORIGINATOR'S REPORT NUMBER(S)

Technical Report No. 14

9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

Status Report of 31 March 1967

10. DISTRIBUTION STATEMENT

This document has been approved for public release and sale; its distribution is unlimited.

11. SUPPLEMENTARY NOTES

12. SPONSORING MILITARY ACTIVITY

Group Psychology Branch
Office of Naval Research
Washington, D.C.

13. ABSTRACT

Weather variables were studied as predictors of police incidents in the City of Fort Worth for a six month period in 1964. Frequencies of 31 categories of calls to the police department and means of 13 weather variables, as well as the day of the year, were computed by six-hour intervals. Correlations among all variables were computed for each of the four quarters of the day over 178 days, and also across all 712 quarter-day periods; nine categories of police calls were selected for further analysis. Each of the five matrices of correlations among the 14 predictor variables was factored by the Criterion Factorization Method using successively each of the 9 selected police variables as criterion. Of the 45 multiple correlations, 13 were significant at the .05 level and 10 at the .01 level. Following Varimax rotation, the factors were matched across time periods for each criterion variable. From 2 to 4 factors were found to match across at least two time periods for each criterion. Two factors, temperature-pressure and precipitation-fog, were found for all criteria; a pressure-wind factor occurred for 8 of the 9 criterion variables, and a precipitation factor occurred for three criteria. Methodological problems suggest caution in interpretation, although both the results and the methods used appear promising for further research.

DD FORM 1 NOV 65 1473 (PAGE 1)

S/N 0101-807-6811

Unclassified

Security Classification

A-31409

Unclassified

Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Behavior ecology						
Situational variables						
Environmental influence						
Meteorological variables						
Police incidents						

DD FORM 1 NOV 65 1473 (BACK)

Unclassified

Security Classification

END

DATE

FILMED

5-24-69