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ANALYTIC STUDY NUMBER SIX REHABILITATION SYSTEM

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16. Abstract

A sample of 79 non-problem drinkers, 173 problem drinkers referred for treatment, and 57 problem drinkers not referred is analyzed using stepwise discriminant analysis. It is determined that there is a statistically significant difference in the three group profiles based on 15 variables. The most important discriminating variable among the groups is previous DUI history. Recidivists are most likely to be problem drinkers. Therefore, the distinction between recidivists and non-recidivists lies in the differences between problem and non-problem drinkers. A time series analysis of 6-month recidivism rates showed that no changes have occurred in such rates in the Wasatch Front since 1969. A time series analysis of DUIconvictions in the Wasatch Front showed a significant decrease in these numbers since the ending of the ASAP operation.

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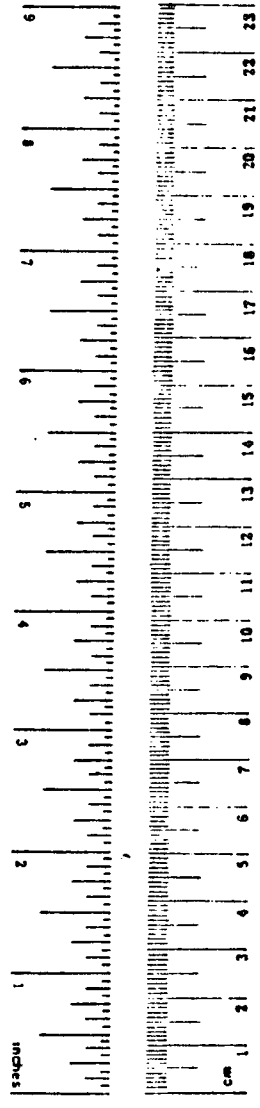
Vertical line denotes change.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

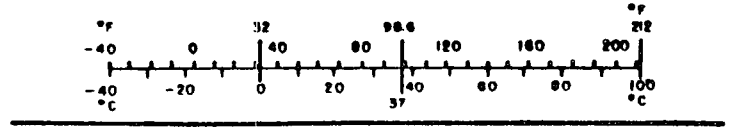
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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INTRODUCTION

The Utah ASAP was operational for three years in the Wasatch Front area (July, 1972, until July, 1975). The project funded activities in several components of the drinking driver system. One such countermeasure was in the area of background investigation and education. Individuals convicted of DUI could be referred by the appropriate court for an evaluation and "treatment" recommendations. These recommendations were made by the probation agency based upon the individual's apparent drinking problem. The purpose of this study is to analyze the groups of drinkers evaluated during the project, to determine a profile of repeat offenders who received background investigations, and to determine whether ASAP efforts aimed at changing the drinking-driving behavior of individuals convicted of DUI during the project had a lasting effect on these individuals.

Analytical Methodology

The comparison of the groups of drinking drivers evaluated will be performed using discriminant analysis. This technique compares the "distances" among the proposed group profiles to determine if there is a significant degree of separation among the groups. This approach will also be used to determine the most significant variables differentiating among the group profiles.

Step-wise discriminant analysis will be used to develop a profile of recidivists. The repeat offenders' background data will be compared to the non-recidivists' background data to determine whether significant differences do exist between the two groups.

Time series analysis will be used to analyze the recidivism rates in the Utah ASAP area. There are 32 quarterly recidivism rates beginning with 1969. The time series model used accounts for overall trend, change in level and trend at the beginning of the ASAP, and changes in level and trend at the ending of the ASAP for these recidivism rates. For a more complete discussion of this approach, see Appendix One of this study.

Analysis of Drinker Type Groupings

A sample of presentence reports was collected from the Salt Lake County Adult Probation and Parole offices for drivers convicted of DUI and sent to this office for background investigation. Three groups of drinkers were categorized by the investigators - social drinkers, problem drinkers, and problem drinkers not referred for treatment. A total sample size of 309 individuals was taken. This includes 79 social drinkers, 173 problem drinkers, and 57 problem drinkers not referred. The purpose of this part of the analysis is to determine whether systematic and consistent criteria are being used to differentiate among the individuals classified into the groups by the investigators. A list of the data elements collected is given in Appendix Two of this study. Variables measured on a classification basis, such as religion, occupation, etc., were transformed to a set of corresponding binary variables.

Table One shows a summary of the stepwise discriminant analysis applied to the sampled drinker types. A total of fifteen variables are found to be different among the three groups.

1. Number of Prior DUI's.

This variable alone accounts for 12% of the variation between the groups. Social drinkers averaged .09 prior DUI's, while problem drinkers averaged 1.0 prior convictions; and problem drinkers not referred averaged .30. This latter proportion differs from 1974 data collected when the problem drinkers not referred averaged 1.6 prior DUI convictions.

TABLE ONE

DISCRIMINANT ANALYSIS SUMMARY

DRINKER TYPE GROUPINGS

STEP NUMBER	VARIABLE ENTERED	F TO ENTER OR REMOVE	NUMBER INCLUDED	SIG.
1	Prior DUI's	20.29893	1	.000
2	Income	15.18962	2	.000
3	Unknown Other Alcohol Offenses	15.59948	3	.000
4	Probation	9.30429	4	.000
5	Student	8.17951	5	.000
6	Length on Job	5.19054	6	.001
7	Retired, Housewife, etc.	6.31620	7	.000
8	Single	5.64625	8	.000
9	LDS	4.85148	9	.004
10	Mortimer-Filkins Score	4.30536	10	.002
11	Employed	3.79063	11	.003
12	Unknown Drinking Patterns	3.96243	12	.002
13	Drinking Patterns	24.91157	13	.000
14	Unemployed	2.97804	14	.019
15	Student (Removed)	.32222	13	.000
16	Unknown BAC	2.34518	14	.048
17	Jewish or Non-Christian	2.07526	15	.064

2. Income.

This variable accounts for an additional 8% of the variation among the groups. Social drinkers' average income was $9,000 per year; problem drinkers' average annual income was $4,400; and the problem drinkers not referred average annual income was $5,600. This may be interpreted to mean an individual's drinking problem decreases his ability to earn money.

3. Unknown Other Alcohol Offenses.

This variable was not found for 7% of the social drinkers, but was missing for 31% of the problem drinkers and 44% of the problem drinkers not referred for treatment. These differences probably reflect information collection techniques. It is difficult to determine whether an individual is a social drinker from the data collected; therefore, prior information is important to the investigator. However, if an individual can be easily diagnosed as a problem drinker, by self-admission, for example, then the investigator does not need to obtain previous offense information. This variable accounts for an additional 7% of the variation among the groups.

4. Probation Recommended.

This variable accounts for an additional 4% of the variation among the groups. Probation was recommended for 89% of the social drinkers, 92% of the problem drinkers, and 75% of the problem drinkers not referred group. This variable is not a diagnostic variable; rather it reflects the likelihood that the investigator will recommend a treatment such as jail as opposed to education, etc. This variable was not found to significantly distinguish between groups in the 1974 sample.

5. Student.

This variable accounts for an additional 4% of the variation among the groups. Of the social drinkers, 10% were students; about 2% of the problem drinkers were students; and 11% of the problem drinkers not referred for treatment were students. These percentages indicate that the investigators are less likely to recommend extensive treatment for students.

6. Length on Job.

This variable accounts for an additional 2% of the variation among the groups, given the previous variables. For non-problem drinkers, the average time at the present job was 2.5 years; for problem drinkers, the average was 9 months; and for problem drinkers not referred, the average was 9 months. This indicates that problem drinkers change jobs more often than social drinkers, and probably have more job-related problems.

7. Retired, Housewife, or Disabled.

This variable accounts for an additional 2% of the variation among the groups. Of the non-problem drinkers diagnosed, 10% were in retired, housewife, or disabled category; 5% of the problem drinkers were in this category; and 2% of the problem not referred were in this category. These percentages indicate that investigators are less likely to recommend extensive treatment for the retired, housewives, or disabled.

8. Single.

About one-third of the social drinkers were single, one-fifth of the problem drinkers were single, and one-third of the problem drinkers not referred for treatment were single. This variable accounted for 2% of the variation among the groups, given the previous variable. It appears

that single individuals are less likely to be recommended for extensive treatment from these sample numbers.

9. Religious Preference L.D.S.

About 37% of the diagnosed social drinkers gave religious preference as L.D.S.; 35% of the problem drinkers had this religious preference; and 58% of the problem drinkers not referred group gave this religious preference. It is possible that investigators may prefer to not recommend an individual of the L.D.S. religion for treatment at the University of Utah, etc., under the assumption that he can obtain help from services available through the L.D.S. Church. The addition of this variable accounted for an additional 2% of the variation among the group profiles.

10. Mortimer-Filkins Score.

The addition of this variable to the group profiles accounts for an additional 1.5% of the variation among the profiles, given the previous variables. The average score for non-problem drinkers diagnosed was 11.3; for problem drinkers, the average was 18.7; and the average for problem drinkers not referred was 13.4. It should be noted that this information was not collected in about 50% of the cases, and the rate for the problem drinkers not referred group was 75%. Therefore, it is likely that other variables were used to determine classification into the latter group by the investigators.

11. Employed.

This variable accounts for 1.5% of the variation among the three group profiles, given the previous variables. Over 70% of the social drinkers were employed, 60% of the problem drinkers were employed, and 63% of the problem drinkers not referred for treatment were employed. This variable

further reflects income differences among the groups.

12. Drinking Pattern Unknown.

The addition of this variable seems to help to distinguish social drinkers; 82% of the social drinkers had patterns reported, while 65% in each of the other two groups showed reported drinking patterns. Perhaps the investigators feel that this information is not of as much value for individuals who may have a problem (it is self-reported). Further, such information would be of little use if an individual had several prior DUI convictions, high Mortimer-Filkins test score, etc., since such an individual would have a fairly obvious drinking problem. The inclusion of this variable into the group profiles accounted for an additional 1.5% of the variation among the groups. This variable was included in the 1974 profiles, but with opposite use. In the earlier profiles, it was found that investigators were less likely to collect this information for social drinkers than for problem drinkers.

13. Drinking Pattern.

When the information concerning a person's drinking habits is collected, it is an important factor in group assignment. Social drinkers report an average of drinking at least monthly, but not as often as once every week. Problem drinkers and problem not referred drinkers drank an average of more often than once a week, but not as often as daily. These self reports seem low, as the reporters tend to bias their own drinking pattern. This variable was included in the 1974 profiles with similar characteristics. The inclusion of this variable into the group profiles resulted in the explanation of an additional 8% of the variation among the profiles, given the previous variables.

14. Unemployed.

The inclusion of this variable added 1% explanatory power among the groups for the proposed group profiles. Only 5% of the social drinkers were unemployed, as compared to 33% of the problem drinkers, and 21% of the problem drinkers not referred for further treatment. This variable further reflects the income differences among the groups, and may also show that problem drinkers have more job-related problems than do social drinkers.

15. Unknown BAC.

The arrest BAC was not collected for about 25% of the social and problem drinkers, and was collected for 33% of the problem drinkers not referred for further treatment. This variable shows that the investigator often does not need extensive data to identify the individuals in the third group. The addition of this variable to the profile increased the explained variation among the groups by less than 1%.

16. Jewish or Non-Christian.

None of the individuals in the first two groups (social, problem) were found to be in this religious category. There were 2% of the problem not referred group who were of non-Christian religions. These numbers are so small that it is reasonable to conclude that the addition of this variable to the profiles is spurious. Less than 1% of the variation among the groups is explained, given the previous variables, by the addition of this variable to the group profiles.

At the final step of the analysis, the group profiles based on the previous variables explained 68% of the variation among the groups. The variables used are measures of prior alcohol history, employment and income status, marital status, religious preference, and data not collected. In

general, problem drinkers seem to have more problems in other areas, such as employment, than do social drinkers. Data collection is most complete for social drinkers, probably because many problem drinkers are easy to identify. Unfortunately, this makes it difficult to relate later treatment effects to measures of an individual's problem.

Repeat Offenders Profile

The sample of individuals taken from the Adult Probation and Parole records was divided into two groups based on their subsequent driving records. A comparison of these two groups will determine whether repeat offenders have a different profile from non-repeaters, and if this is the case, what the differentiating variables are. There were 41 recidivists in the sample and 268 non-recidivists. Table Two shows a summary of the discriminant analysis results.

1. Other Race.

This variable denotes racial background other than Caucasian, Mexican, Indian, Negro, or Oriental. About 12% of the repeaters came from these racial backgrounds, while fewer than 3% of non-repeateers were of these racial backgrounds. Since this variable discriminated between the groups, it would be appropriate to develop treatment recommendations for individuals of "other" racial backgrounds. This variable accounts for 3% of the variation between the two groups.

2. Race - Negro.

The addition of this variable to the repeater profile increases the explained variation between the profiles by 2.5%. More than 7% of the repeaters were Negroes, while there was only 1% Negroes in the non-repeater group. Perhaps this reflects the cultural aspects of the various treatment services available in the ASAP community.

3. Education Unknown.

This data element was not collected for 5% of the repeaters and was not collected for less than 1% of the non-repeaters. It explains 2.5% of the variation between the groups, given the previous variable. This indicates an overall lack of background information for some types of individuals which

TABLE TWO

DISCRIMINANT ANALYSIS SUMMARY

RECIDIVISTS GROUPS

STEP NUMBER	VARIABLE ENTERED	F TO ENTER OR REMOVE	NUMBER INCLUDED	SIG.
1	Other Race	8.94566	1	.003
2	Negro	7.98414	2	.004
3	Education Unknown	5.85162	3	.013
4	Unknown Other Alcohol	5.37405	4	.016
5	Retired, Housewife, etc.	3.43359	5	.051
6	Number of Marriages	3.89526	6	.036
7	Age	4.02997	7	.032
8	Widowed	6.00371	8	.008
9	Prior DUI's	3.14812	9	.053
10	Unknown Prior DUI's	2.11986	10	.110

makes it difficult for the investigator to make appropriate recommendations.

4. Unknown Prior Alcohol Offenses (Exluding DUI).

The inclusion of this variable into the profiles added 1.6% to the explained variation between the two groups. In about 44% of the repeater cases, the investigator had failed to collect this information, while the information was missing in about 25% of the non-repeater cases. Such a situation may be indicative of an overall lack of information for some types of individuals which makes a difficult task for the investigator to make appropriate referral recommendations. In any event, there appears to be no reason to exclude this information from the investigation based on the comparison of repeaters and non-repeaters.

5. Retired, Housewife, Disabled, Etc.

None of the repeat offenders were found to be in this employment category. About 7% of the non-recidivists were housewives, retired, etc. The inclusion of this variable into the analysis increased the explained variation between the two groups by 1%.

6. Number of Marriages.

This variable increased the explanatory power of the profiles by 1%. Repeaters had been married an average of 1.4 times and non-repeaters had been married an average of 1.0 times. This variable reflects the overall difficulties that many problem drinkers experience.

7. Age.

Repeaters were found to be somewhat younger than non-repeaters, given the previous profile variable (34 years versus 35 years). This variable accounted for 1.2% of the variation between the groups.

8. Widowed.

Repeat offenders were widowed in 7% of the cases. Non-repeat offenders were widowed in 3% of the cases. The addition of this variable to the profile accounted for 1.7% of the variation between the groups.

9. Prior DUI Conviction.

Since it was found that problem drinkers are more likely to have a previous DUI conviction on record than are social drinkers, the inclusion of this variable into the profiles indicates that problem drinkers are more likely to be repeat offenders than are non-problem drinkers. Repeaters had an average of one DUI conviction on record, while non-repeaters averaged .6 DUI convictions on record. This variable increased the explained variation between the groups by 1%. The inclusion of this variable into the profiles shows that many types of individuals are likely to re-enter the DUI system in spite of the present efforts aimed at changing their drinking-driving behavior.

10. Prior DUI Convictions Unknown.

The addition of this variable to the analysis increases the amount of variation explained by the group profiles by 1%. The previous DUI history was missing in 32% of the repeater cases and in 15% of the non-repeater cases. Again, there is no evidence, based upon repeat offenses, that such data should be excluded from the background investigation.

There are two basic differences to be observed from the discriminant analysis profile comparisons. One is that effective treatment is not available for racial minorities in the Wasatch Front area. The other is that those individuals for which it is difficult to collect pertinent background data are also the most likely individuals to be repeat DUI offenders. Therefore,

it is difficult to develop a meaningful repeater profile due to the lack of this pertinent data. The significant missing data centers on alcohol related variables, previous alcohol offenses (excluding DUI), BAC at arrest, and previous DUI offenses. Therefore, it is logical to recommend to the background investigation agencies in the area that increased attention be given to a complete data collection effort by the investigators.

If the missing data is ignored, it can be shown from the data that repeaters have more previous DUI convictions, fewer previous other alcohol offenses, the same likelihood of having been placed on probation, are less likely to be L.D.S., report the same drinking patterns, have the same income level on the average, have similar Mortimer-Filkins test scores, are the same ages and sex, have the same average marital status, have been working at their present jobs about the same length of time, and have more previous criminal arrests than do the non-repeaters. It was also determined that the average length of time the next arrest was less than 3 months for the repeaters. It appears that the background data concerning previous types of offenses is most relevant to the analysis of repeat offenders.

Recidivism Rates Analysis

The numbers analyzed in this section of the study are the six-month reconviction rates in the ASAP area since 1969. That is, for those convicted during a given quarter, the proportion of those re-convicted during that same quarter or the following quarter is calculated. These proportions form a time series with 32 observations (1969-1976). The numbers in Table Three show the autocorrelations for this time series.

The autocorrelations in Table Three show that the time series is non-stationary. Therefore, the autocorrelation function of the first differences of the time series was analyzed. The results of this analysis are found in Table Four.

The autocorrelations in Table Four show that the differenced time series may be assumed to be a random process. The "design" matrix used included trend, change in level due to ASAP, change in trend due to ASAP, change in level at the end of ASAP. This "design" matrix was transformed by taking the first differences, and a multiple regression program was used to determine the relationship of the transformed time series to the transformed "design" matrix. The results of this analysis are found in Table Five.

The numbers in Table Five show that there is no significant relationship between the time series and the "design" matrix. That is, there have been no statistically significant changes in six-month recidivism rates since 1969.

TABLE THREE

AUTOCORRELATIONS

SIX-MONTH RECIDIVISM RATES

(N = 32)

LAG	AC.	T	Partial AC.
1	.7681	3.072	.7681
2	.6329	2.008	.1047
3	.6768	1.919	.3973
4	.5607	1.433	-.2196
5	.4493	1.081	.0143
6	.4418	1.026	-.0055
7	.4415	.993	.1721
8	.4989	1.091	.3296
9	.6529	1.375	-.5076
10	.5472	1.090	-.1086
11	.4802	.923	-.6891
12	.5007	.938	-.4799

TABLE FOUR

AUTOCORRELATIONS
SIX-MONTH RECIDIVISM RATES
FIRST DIFFERENCES
(N =32)

LAG	AC.	T	PARTIAL AC.
1	-.2410	-.949	-.2410
2	-.3962	-1.516	-.4823
3	.4025	1.438	.2022
4	-.0772	- .259	-.1249
5	-.2521	- .844	-.0702
6	-.0008	- .002	-.3304
7	-.1298	- .425	-.4307
8	-.1565	- .509	-.7087
9	.5377	1.735	.3078
10	-.1352	.399	-.0498
11	-.1397	- .411	.0945
12	.4262	1.246	-.6826

TABLE FIVE

ANALYSIS OF VARIANCE
SIX-MONTH RECIDIVISM RATES

Analysis of Variance

	DF	SS	MS	F	P
Regression	4	.00036	.00009	.21	--
Residual	27	.01106	.00041		

Estimates:

i	bi	S.E.	F
1	-	-	-
2	.015	.021	.489
3	-.005	.008	.373
4	-.060	.114	.277
5	-.004	.011	.142

DUI Convictions Analysis

The observations in this time series are the monthly counts of DUI convictions in the ASAP area. Table Six shows the analysis of the autocorrelation function of this sequence. The numbers in Table Six show that the series is non-stationary. Therefore, the autocorrelation function of the first differences of the series is analyzed in Table Seven. The numbers in Table Seven show that the differenced series is of the autoregressive type or the mixed autoregressive moving average type. The recursive least squares algorithm showed the series could be adequately modelled as first order autoregressive and second order moving average. The autoregressive parameter was found to be -.40 with standard error of .15. The moving average parameters were found to be -.11 and -.26 with standard errors .02 and .11, respectively. The annual cycle was accounted for by taking twelfth differences of the original time series.

The series and "design matrix" were transformed using $F(B)=(1-B^{12})_X (1-B)(1+.40B)$ and $T(B)=1+.11B+.26B^2)$. Table Eight shows the results of the regression analysis relation of W_t to H(t). The numbers in Table Eight show that the transformed time series is significantly related to the transformed "design matrix", at the .02 level of significance. The major contributing variable to this relationship is the change in the trend at the end of ASAP operation. The change in trend is estimated as a decrease of between 25 and 95 convictions per month (approximate 95% confidence interval).

In summary, when the ASAP ended, there was a decrease in the trend of DUI convictions in the Wasatch Front area which has averaged 65 convictions per month.

TABLE SIX

DUI Convictions Autocorrelations

(N=96)

Lag	AC.	T	Partial AC.
1	.8679	8.50	.8679
2	.8319	6.16	.3186
3	.7347	4.60	-.1528
4	.6566	3.72	-.0984
5	.6082	3.22	.1304
6	.5402	2.72	-.0231
7	.4790	2.32	-.1033
8	.4366	2.06	.0583
9	.3932	1.82	.0615
10	.3900	1.77	.1229
11	.3442	1.54	-.1274
12	.3593	1.59	.1434
13	.2248	.98	-.5402
14	.1862	.79	.0068
15	.0946	.41	.0612

TABLE SEVEN

First Differences

DUI Convictions Autocorrelations

(N=96)

Lag	AC.	T	Partial AC.
1	-.3652	-3.56	-.3652
2	.2270	2.08	.1080
3	-.0707	-.63	.0498
4	-.1213	-.108	-.1812
5	.0548	.49	-.0457
6	.0046	.04	.0824
7	-.0163	-.15	-.0055
8	.1526	1.35	.1221
9	-.0735	-.65	.0344
10	.0763	.67	.0274
11	-.2119	-1.85	-.2097
12	.4647	3.99	.4762
13	-.3742	-2.97	-.1260
14	.2691	2.05	-.0505
15	-.1243	-.93	.0165

TABLE EIGHT

Analysis of Variance

DUI Convictions

AOV

	DF	SS	MS	F	P
Regression	6	60170.18	10028.36	2.84	.02
Residual	76	268865.68	3537.71		

i	b_1	S.E.	F	
1	-	-	-	
2	57.80	40.00	2.09	
3	-10.30	18.94	.30	
4	50.24	39.98	1.58	
5	18.13	18.94	.92	
6	-301.07	672.63	.20	
7	-70.34	29.40	5.72	(P=.02)

AOV

	DF	SS	MS	F	P
Regression	1	40394.76	40394.76	11.34	.001
Residual	81	288641.09	3563.47		

Estimates:

i	b_1	S.E.	F
7	-60.05	17.83	11.34

Conclusions

1. Background investigators in the Utah ASAP area systematically classify drinkers referred into three groups - social, problem, and problem not referred for further treatment.

2. The most important characteristic differentiating among the three drinker groups is previous DUI history.

3. Employment status, income level, religious preference, and drinking patterns are used in addition to DUI history to determine the level of the drinking problem for those referred for background investigation.

4. There is a substantial amount of missing data in the background investigations, especially for many problem drinkers.

5. Repeat offenders are likely to be of minority racial background, younger, and more likely to have a prior DUI history than are non-repeaters.

6. There is a substantial amount of missing data in the background investigations for those who were repeat offenders. This hinders in-depth analysis of the factors related to recommendation, treatment, and recidivism.

7. There has been no change in six-month recidivism rates in the Utah ASAP area since 1969.

8. DUI convictions have significantly decreased in the Wasatch Front since the ending of ASAP operations.

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4. Glass, G.V., "Estimating the Effects of Intervention into a Nonstationary Time Series", American Educational Research Journal, 9, No. 3, 1972, 463 - 477.

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APPENDIX ONE

Time Series Analysis Model

There are 96 monthly counts of DUI conviction data and 32 quarterly recidivism rates. The following equations will pertain to the quarterly recidivism rates, but may be easily extended to the DUI conviction counts.

Each time series is first analyzed to determine its underlying autocorrelational structure. If the series is stationary, then an appropriate time series model is found (such as autoregressive, moving average, etc.). This model is used to remove the autocorrelation from the series. The residuals are then used to determine the impact of ASAP on recidivism rates or DUI convictions.

The following assumptions are used to perform the time series analysis:

(1) $Z_t=f(t)+N_t$, where Z_t= the quarterly recidivism rates, $f(t)$ is a deterministic function of time, and N_t is a sequence of correlated errors;

(2) $F(B)N_t=T(B)a_t$, where B is the backshift operator, F and T are invertible "autoregressive" and "moving average" polynomials in B, respectively, and a_t is a sequence of random errors;

(3) $f(t)=f_1(t)+f_2(t)+f_3(t)+f_4(t)+f_5(t)$,
where:
$f_1(t)=b_1t$ (the overall trend);
$f_2(t)=0$, $1\leq t\leq 14$ or $26<t\leq 32$,
$=b_2$, $14\leq t\leq 26$ (the change in level due to ASAP);
$f_3(t)=0$, $1\leq t\leq 14$ or $26<t\leq 32$,
$=b_3t$, $14\leq t\leq 26$ (the change in trend due to ASAP);
$f_4(t)=0$, $1\leq t\leq 26$,
$=b_4$, $26<t\leq 32$ (the change in level due to the ending of ASAP);
$f_5(t)=0$, $1\leq t\leq 26$,
$=b_5t$, $26<t\leq 32$ (the change in trend due to the ending of ASAP).

It should be noted that $f(t)$ is used to generate a "design matrix" which contains variables for ASAP effects. Also, $f(t)$ may be altered by the appropriate transformation which removes the autocorrelation from the errors. That is, the transformation applied to N_t must also be applied to $f(t)$. The resulting model is:

(4) $W_t=H(t)+a_t$, where $T(B)W_t=F(B)Z_t$, $T(B)H(t)=F(B)f(t)$, and the a_t are random errors obtained from $F(B)N_t=T(B)a_t$.

A standard multiple regression program is used to estimate the b_i, the assumed effects. A recursive least squares algorithm is used to determine the unknown coefficients in F(B) and T(B).

A theoretical discussion of the aspects of this analysis approach is found in (1) and (2) of the bibliography.

APPENDIX TWO

Data Element Listing

CODING INSTRUCTION SHEET

FIELD NAME	CODING	COLUMN	MEANING
GROUP TYPE	1	1	NON-PROBLEM
	2		PROBLEM REFERRED
	3		PROBLEM NOT REFERRED
ARREST DATE			
MONTH	1-12	2-3	
DAY	1-31	4-5	
YEAR	00-99	6-7	
AGE	00-99	8-9	AGE IN YEARS
SEX	1	10	MALE
	2		FEMALE
MARITAL STATUS	1	11	SINGLE
	2		MARRIED
	3		SEPARATED
	4		DIVORCED
	5		WIDOWED
	6		UNKNOWN
RACE	1	12	CAUCASIAN
	2		NEGRO
	3		MEXICAN
	4		INDIAN
	5		ORIENTAL
	6		OTHER
MF SCORE	00-99	13-14	SCORE
	99		UNKNOWN
BAC	00-49	15-16	% OF ALCOHOL IN BLOOD
	50		REFUSAL
	99		UNKNOWN
PRIOR DUI	00	17-18	NONE
	1-90		NUMBER
	99		UNKNOWN
PRIOR OTHER ALC/MEL	00	19-20	NONE
	1-90		NUMBER
	99		UNKNOWN
PRIOR OTHER CRIME	00	21-22	NONE
	1-90		NUMBER
	99		UNKNOWN
NUMBER OF MARRIAGES	0	23	NONE
	1-8		NUMBER
	9		UNKNOWN

FIELD NAME	CODING	COLUMN	MEANING
EDUCATION	1	24	PROFESSIONAL/GRADUATE SCHOOL
	2		FOUR YEAR COLLEGE GRADUATE
	3		1-3 YEARS OF COLLEGE
	4		HIGH SCHOOL GRADUATE
	5		10-11 YEARS OF SCHOOL
	6		7-9 YEARS OF SCHOOL
	7		UNDER 7 YEARS OF SCHOOL
	8		UNKNOWN
RELIGION	1	25	LDS
	2		PROTESTANT
	3		CATHOLIC
	4		JEWISH - NON CHRISTIAN
	5		NONE
	6		UNKNOWN
LABOR FORCE STATUS	1	26	EMPLOYED FULL TIME
	2		EMPLOYED PART TIME
	3		UNEMPLOYED
	4		ILL, INJURED, RETIRED, HOUSEWIFE
	5		STUDENT
	6		UNKNOWN
OCCUPATION	1	27	EXECUTIVES OF LARGE CONCERNS, PROPRIETORS, PROFESSIONALS,
	2		BUSINESS MANAGERS, PROPRIETORS OF MEDIUM SIZED BUSINESSES, LESSER PROFESSIONALS.
	3		ADMINISTRATIVE PERSONNEL, OWNERS OF SMALL BUSINESSES, MINOR PROFESSIONALS.
	4		CLERICAL, SALES WORKERS, TECHNICIANS, OWNERS OF LITTLE BUSINESSES.
	5		UNSKILLED EMPLOYEES.
	6		WELFARE
	9		UNKNOWN
INCOME	1	28	LESS THAN $2,000
	2		$2,000 TO $3,999
	3		$4,000 TO $5,999
	4		$6,000 TO $7,999
	5		$8,000 TO $9,999
	6		$10,000 TO $11,999
	7		$12,000 TO $13,999
	8		$14,000 TO $15,999
	9		$16,000 OR OVER
	0		UNKNOWN
LENGTH OF TIME ON JOB	1	29	OVER THREE YEARS
	2		1 TO 3 YEARS
	3		6 MONTHS TO 1 YEAR
	4		6 MONTHS OR LESS
	5		UNEMPLOYED
	6		UNKNOWN

FIELD NAME	CODING	COLUMN	MEANING
DRINKING PATTERN	1	30	3 OR LESS TIMES A YEAR
	2		3-6 TIMES A YEAR
	3		ONCE A MONTH
	4		AT LEAST ONCE A WEEK
	5		DAILY
	6		UNKNOWN
PROBATION RECOMMENDED	1	31	YES
	2		NO
TIME TO SUBSEQUENT ARREST	1-17	32-33	NUMBER OF MONTHS
	18		NO ARREST

COL. NO.	NAME	VAR. NO.
1	Group Type	NA
2-3	Arrest Month	1
4-5	Arrest Day	2
6-7	Arrest Year	3
8-9	Age	4
10	Sex	5
11	Single (Binary)	6
12	Married (Binary)	7
13	Separated or Divorced (Binary)	8
14	Widowed (Binary)	9
15	Unknown Status (Binary)	(Not included in Analysis)
16	Caucasian (Binary)	10
17	Negro (Binary)	11
18	Mexican (Binary)	12
19	Indian (Binary)	13
20	Oriental (Binary)	(Not included in Analysis)
21	Other Race (Binary	(Not included in Analysis)
22-23	MF Score	14
24	Unknown MF (Binary)	15
25-26	BAC	16
27	Refusal (Binary)	17
28	BAC Unknown (Binary)	18
29-30	Prior DUI's	19
31	Unknown Priors (Binary)	20

32-33	Prior Other Alcohol Offenses	21
34	Unknown Other (Binary)	22
35-36	Prior Criminal	23
37	Unknown Criminal (Binary)	24
38	No. Marriages	25
39	Unknown Marriages (Binary)	26
40	Education	27
41	Education Unknown (Binary)	28
42	LDS (Binary)	29
43	Protestant (Binary)	30
44	Catholic (Binary)	31
45	Jewish or Non-Christian (Binary)	32
46	None (Binary)	33
47	Unknown Religion (Binary)	34
48	Employed (Binary)	35
49	Employed Part Time (Binary)	36
50	Unemployed (Binary)	37
51	Retired, Housewife, Etc. (Binary)	38
52	Student (Binary)	39
53	Unknown (Binary)	40
54	Executive, Professional (Binary)	(Not included in Analysis)
55	Business Manager (Binary)	41
56	Administrator (Binary)	42
57	Clerical (Binary)	43
58	Laborer (Binary)	44

59	Welfare (Binary)	45
60	Unknown (Binary)	46
61	Income	47
62	Income Unknown (Binary)	48
63	Length on Job	49
64	Unknown Length (Binary)	50
65	Drink Pattern	51
66	Drink Pattern Unknown (Binary)	52
67	Probation (Binary)	(Not included in Analysis)
68-69	Time to Next Arrest	53
70	No Subsequent Arrest (Binary)	54

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