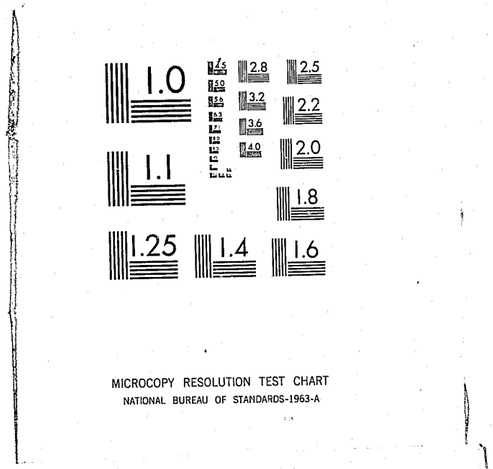

Statistical Prediction of Recidivism Among *Female Parolees* in the California Youth Authority

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rch Report No. 57
January, 1970

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TABLE OF CONTENTS

LIST OF TABLES

SUMMARY

A very large sample of the female wards released to parole in 1963 and 1964 (2,001) was used as a construction sample to develop an instrument to predict recidivism within 15 months of release. A large sample of the female parolees released in 1965 (1,182) was used as the validation sample. Seven of a large number of variables were selected to be used in a multiple regression equation to predict the recidivist - non-recidivist criterion. Of these seven, an equation using five of the variables was employed to develop a prediction table. These five variables were: age at admission to the Youth Authority, age at release to parole, admission status, number of co-offenders in the commitment offense, and number of foster home placements. Age at release to parole contributed the most weight to the predicted score. The multiple correlation coefficient for the five variables was .246 in the construction sample.

A three category prediction (base expectancy) table was developed from the predicted scores based on the regression equation. The proportion of recidivists in each category was .544, .364 and .260 in the construction sample. The respective proportions in the 1965 validation sample were: .513, .361 and .237. The overall recidivism rates were .345 in the 1963-64 sample and .318 in the 1965 sample.

The index of predictive association and the mean cost rating, two methods of statistical evaluation of prediction tables, showed very limited predictive ability in both construction and validation samples.

A brief discussion of possible reasons for the common finding of the relationship between age and recidivism rates stressed age as an indicator of early development of delinquent patterns, and the differential reaction of law enforcement and correctional authorities to misbehavior as a function of age.

Several possible uses, as well as some limitations of prediction tables, were listed. The uses were: providing information about the correlates of recidivism; utilizing this information to assess changes in the population with respect to recidivism-related variables; providing a statistical "control" for program evaluation; and helping in decision-making concerning offenders. The limitations of the use of prediction tables mainly concerned its decision-making functions. Among the criticisms listed were: the possible misapplication of a score category (probability of recidivism) based on a large group of parolees to a specific individual or group; the limited amount and type of information which make up most prediction tables; the lack of strong relationships between most prediction tables and the recidivism criterion; and the lack of information relevant to time of release or program decisions provided by prediction tables.

In order to evaluate the utility of a prediction table for a correctional agency eight factors were considered. They were: the goals of the agency; the decisions which may involve the prediction table; the constraints under which these decisions are made; the decision-strategy involved in using the table; the outcomes of the decisions made using the table; the values for the agency these outcomes produce; the comparison of the outcomes with those resulting from decisions not using the prediction table; and the policy changes that may result from the use of prediction tables.

It was concluded that the prediction tables, such as the one developed here, did not have much utility with respect to parole or program decisions in the Youth Authority or as a statistical "control" for program evaluation.

Prediction tables may be more useful in helping to explain the basis for recidivism and to provide other information concerning characteristics which relate to recidivism.

INTRODUCTION

This is a report on the statistical prediction of recidivism among female Youth Authority parolees, chiefly using information available when the ward is committed (or recommitted) to the Youth Authority and the method of multiple regression of selected variables on the recidivism criterion. The statistical prediction of recidivism using "background" variables has been taking place for over 10 years in the California correctional system (Youth Authority and Department of Corrections). Statistical techniques for combining information into a prediction instrument have included, in addition to multiple regression analysis (3,4,7,16), association analysis (21), and configuration analysis (13, 27). The use of multivariate statistical techniques to predict recidivism among female parolees in California have been published by Bohnstedt (9) for California Youth Authority wards and by Gottfredson, Ballard and Bonds (20) and Gottfredson and Ballard (18) for female parolees of the California Department of Corrections. In addition, a statistical study of the relationships between a large number of variables and recidivism for female Youth Authority parolees was made by Guttmann (24). The latter study, however, did not combine variables in order to develop prediction (expectancy) tables.

The studies employing multivariate approaches have resulted in expectancy tables with varying numbers of categories of parolees with different rates of recidivism. Some of these tables have been able to define groups of parolees with expected rates of recidivism substantially above and below the rate for the total sample. Comparisons of the accuracy of prediction of tables developed in the present study with those cited above will be made later in the report. However, it should be noted that the various studies have used different criteria of recidivism.

Table 1 presents a summary of several California studies using multivariate combinatorial methods to predict recidivism among female parolees. Each of the studies summarized in Table 1 developed prediction tables which were able to identify groups of parolees with recidivism rates different from that of the base rate in the sample. This was true even when the base rate of recidivism was very low, as in the studies by Gottfredson and Ballard. However, the utility of prediction tables for routine parole or program decisions, or policy planning, is questionable. This will be discussed in some detail in the discussion section.

Table 1

Summary of California Studies Using Multivariate Statistical Methods to Predict Recidivism Among Female Parolees

Investigator	Sample	Criterion of Recidivism	Variables which Contributed Most to Prediction	Statistical Method	Results
Bohnstedt*	1,559 girls released to parole from the two Y. A. schools for girls between Jan. 1954 and Dec. 1957.	Suspension of parole within one year of release to parole.	Age at first admission; county of admission; age at release to parole.	Multiple regression.	R = .243 Five expectancy categories with suspension rates ranging from .315 to .721
Gottfredson, Ballard and Bonds*	695 women released from Calif. Institution for Women to California parole supervision between July 1, 1955 and June 30, 1958.	Return to any state or federal prison as a parole violator or death as a result of commission of a felony within 2 years after release to parole.	History of heroin use; history of alcohol use; number of aliases in official arrest record.	Multiple regression.	R = .40
	Validation sample - 577 women released from same institution between July 1, 1958 and June 30, 1960.				Three expectancy categories with return rates ranging from .150 to .460.**
Gottfredson & Ballard*	134 women released from the Calif. Institution for Women between May 1962 and May 1963.	Return to prison within one year of release to parole.	Cottage and work adjustment;*** CPI Self-acceptance score;*** CPI Socialization score; Assaultive infractions in institution; MMPI subtle paranoia score.	Multiple regression.	No multiple regression coefficient given.
	Validation Sample - 131 women released from the California Institution for Women between May 1962 and May 1963.				R = .22** Three expectancy categories with rates of return ranging from .150 to .333**

Table 1 (Concluded)

Summary of California Studies Using Multivariate Statistical Methods to Predict Recidivism Among Female Parolees

Investigator	Sample	Criterion of Recidivism	Variables Which Contributed Most to Prediction	Statistical Method	Results
Gottfredson & Ballard*	381 women released from the California Institution for Women - 188 in construction sample; 193 in validation sample.	Return to prison within one year of release to parole.	History of previous incarceration; history of heroin use.	Association analysis#	Three groups with return rates ranging from .061 to .360 for the combined construction and validation samples.

* See References on pages 40 and 41.

** Validation sample only.

*** Negative weights.

\# A technique of analysis which consists of relating a number of variables (tested by means of chi square) to identify groups homogeneous with regard to these variables. The criterion, recidivism, is not taken into account in the combining process. Recidivism rates of the various homogeneous groups developed by this method are subsequently calculated.

PROCEDURE

The procedure followed four of the five steps of any prediction study, as summarized by Gottfredson (17). The first step is to define the criterion categories which are to be predicted. In this study recidivism will be defined, as in most other studies of Youth Authority wards, as a suspension of parole within 15 months after release to parole, which leads to a revocation of parole or discharge from Youth Authority jurisdiction. Revocation almost always results in a return to incarceration, and discharge from a suspended parole status often results in incarceration or supervision by another agency (county probation, California Department of Corrections, other state or federal correctional systems, Department of Mental Hygiene, etc.). Some wards are suspended and subsequently discharged as the result of having been missing for some time. Any ward whose parole was not suspended, or whose suspension within 15 months of release did not result in a revocation of parole or discharge was defined as a non-recidivist. The follow-up period of 15 months has been used in most Youth Authority prediction studies (3,4,5,7) although the only other prediction study using multivariate methods on Youth Authority female parolees used a different criterion of recidivism, that of suspension of parole (9). The fifteen month follow-up period was initially chosen in prediction studies of male Youth Authority parole releasees as the point in time when there was close to a 50-50 split between recidivists and non-recidivists. Such a split for a dichotomous criterion provides the best opportunity for statistical prediction to achieve results better than those obtained by knowledge of the total rates in the criterion categories (base rates). However, the recidivism rates of the samples of females used were much less than 50 percent. It would have taken a much longer follow-up period to obtain a 50 percent recidivism rate among female Youth Authority parolees. Recidivism as defined, is an objective, administratively

useful criterion to predict or to use for purposes of program evaluation. There are many criticisms that can be made of any such legal-type definition of recidivism such as used in this and most other correctional studies, especially if one wishes to employ it as a measure of "rehabilitation", treatment effects, changes in people, extent of delinquent behavior, or the effectiveness of a correctional system. Some aspects of the relationship between behavior and the recidivism criterion for female Youth Authority parolees has been discussed by Guttmann (24).

The second step stated by Gottfredson is the selection and definition of those variables which will be employed to predict the criterion. The variables selected came from a group of 54 variables which were routinely gathered for all wards committed to the Youth Authority between 1960 and 1965. Guttmann (24) related each of 48 items from the Initial Home Visit Research Schedule, and six other variables to the 15-month criterion of recidivism defined above for a combined cohort of females released to parole supervision in California during 1961 and 1962.

The Initial Home Visit Research Schedule (IHV) was completed by a parole agent after his initial visit to the ward's home soon after the ward's commitment to the Youth Authority. The 48 items on the IHV schedule used by Guttmann (24) included those which asked for information about type of house, residential mobility, parental continuity (including number of foster homes), ward-parent relationships, ward activities and behavior at home, number of partners in the ward's current offense, school misbehavior, indications of prior maladjustment (including excessive drinking, psychiatric observation, and continuity of childhood symptoms such as bed-wetting and thumb-sucking), criminal record of family members, and the parole agent's judgments about the family. The other six variables were: age at release to parole, institution of release, ethnic group,

prior delinquent record, commitment offense and admission status (first admission to the Youth Authority versus re-admission after having had parole revoked one or more times). Each of these 54 variables was related to the recidivist - non-recidivist criterion by means of a contingency table and the significance of the relationship tested by chi-square. Guttmann found that 21 of the 54 variables were statistically significant at the .10 level of confidence or better and 11 of these significant at the .05 level or better (24).

This information provided a good starting point for selecting the predictor variables. Nineteen of the 21 significant variables were examined with regard to their relationship to the recidivism - non-recidivism criterion in a cohort of females released to California parole supervision in 1963 and 1964. The two variables not examined were institution of release and court of commitment. The former was not used since this would have little meaning outside the Youth Authority. No information concerning the ward's behavior or experience while in an institution or on parole were used as predictors. Court of commitment was not examined because only a very small percent of female wards are committed to the Youth Authority from other than the juvenile courts. Only two of these 19 variables, which Guttmann found statistically differentiated recidivists and non-recidivists at the .10 level of confidence or better, were statistically significant in both the 1963 and 1964 cohorts and in the same direction as in the Guttmann study. These two were age at release to parole and number of co-offenders in the current offense. Several other variables found significant by Guttmann in the 1961-62 cohort would have been significant at the .10 level of confidence or better if the 1963 and 1964 cohorts had been combined.

In addition to the 19 variables which were statistically significant in the Guttmann study, most of the other 54 used in her study were examined in the 1963 and 1964 cohorts. Two variables not significant at the .10 level or

better in the 1961-62 cohort were significantly related to the criterion in both the 1963 and 1964 cohorts and in the same direction for both groups. They were serious school misbehavior and number of foster home placements. One variable not included in Guttmann's study was also examined, age at first admission to the Youth Authority.* This was found to be highly significant in both 1963 and 1964 cohorts.

It was arbitrarily decided that a relatively small number of variables would be selected in advance and related to the criterion by means of multiple regression. There was no one guideline or rationale which was used to select the predictor variables. The relationship of the variable to the criterion (in terms of statistical significance) in Guttmann's study and in the 1963 and 1964 cohorts was taken into account as well as such considerations as the relationship of the variable to recidivism in other studies and the availability of the information after 1964.

The pre-selection of a limited number of predictor variables is a somewhat different approach than starting with a large number of variables and then eliminating those which do not contribute to the criterion variance (the stepwise multiple regression method). Seven variables were chosen. In addition to the two variables statistically significant in both Guttmann's study and in both the 1963 and 1964 cohorts, age at release to parole and number of co-offenders in the current offense, two variables significant in both the 1963 and 1964 cohorts but not significant in the 1961-62 cohort were chosen, serious school misbehavior and number of foster home placements. Three other variables

*This was not an oversight on Guttmann's part, as all of the female parole releasees in her 1961 sample were first admissions, and only 16 percent of the 1962 sample were re-admissions. Since the correlation between age at first admission and age at release to parole is practically unity among first admissions, only one of the two variables were chosen for analysis.

were chosen. One was history of psychiatric or psychological observation, evaluation or therapy. This variable was statistically significant in the 1961-62 and 1964 cohorts, but not in the 1963 cohort, although in the latter group the direction of its relationship to recidivism - non-recidivism was the same as in the other two cohorts. Indications of psychological maladjustment as measured by this item from the Initial Home Visit Research Schedule may have an important bearing on whether or not some girls have their parole revoked (see Guttmann page 38).

Another variable used was the admission status of the ward. This refers to whether or not the ward has had her parole revoked previously while in the Youth Authority. First admissions are those who had no previous parole revocations and were in the Youth Authority for the first time. This variable was highly significant in Guttmann's study, significant in the 1963 cohort, but not significant in the 1964 cohort. Admission status has been found to be one of the most powerful predictors of recidivism among Youth Authority male wards (3, 4).

The seventh variable selected to be used as a predictor was age at first admission to the Youth Authority. Although correlated with age at release to parole, age at first admission to the Youth Authority has been shown to have some unique contribution to prediction in the total sample of both first and readmissions for Youth Authority male wards (3, 7). This variable showed strong and consistent ability to differentiate recidivists and non-recidivists in both the 1963 and 1964 cohorts. Guttmann did not include age at admission in her study because almost all of her sample were first admissions and the two age variables were almost perfectly correlated.

The third step is the determination of the relationship between predictors and criterion. Part of the third step of a prediction study but not

explicitly stated by Gottfredson involves a decision as to what techniques to use to relate the predictors to the criterion. This involves a meaningful choice when multiple variables are used. The method used here is multiple regression. Other methods of combining several variables for purposes of separating groups of recidivists from non-recidivists have been described and utilized by Wilkins and MacNaughton (27), Glaser (13), Gottfredson, Ballard and Lane (21), Gottfredson and Ballard (18, 19), Gottfredson, Ballard, Mannering and Babst (22). These methods can be subsumed under the term configural methods. A combination of configural and regression techniques has also been used (19). In a paper by Babst, Gottfredson and Ballard (2) comparisons were made between multiple regression and configural techniques in differentiating known recidivists and non-recidivists, and in predicting the proportion of recidivists in a validation sample. Both techniques, when applied to the same data, performed very similarly when several different measures were used to compare the results in both construction and validation samples. Although arguments by Glaser (13) and Gottfredson and Ballard (19) tend to favor some type of configural approach there is no evidence to suggest that used alone, these methods are better for purposes of prediction than the regression approach. Babst, Gottfredson and Ballard (2) discuss the merits of both configural and multiple regression techniques.

Multiple regression is a statistical procedure which, by taking into account the relationships among the predictors as well as between the predictors and the criterion, results in a set of optimal weights for each predictor variable. These optimal weights are used to obtain the best estimate of the criterion, and the multiple correlation coefficient is the correlation between this best estimate of the criterion and the actual criterion. A multiple correlation coefficient may be interpreted similarly as a correlation

coefficient in a bivariate situation (one predictor and one criterion).

The optimal weights determined for each predictor variable can be applied to each subject. The subject's value on each of the predictors is multiplied by the optimal weight for that predictor and these separate products are summed (taking sign into account). This sum is the subject's predicted score. Scores are then distributed and grouped in order to produce several score categories with varying rates of recidivism. There are many methods which can be used to group the scores into meaningful categories with respect to the criterion. The method used for the construction sample in the present study will be described later. The score categories, along with their different rates of recidivism, comprise the prediction (base expectancy) table.

A multiple regression of the seven variables on the recidivist - non-recidivist criterion was performed for the 1963 and 1964 cohorts combined.* This combined cohort is the construction sample. In addition, regression analyses of all possible combination of six and five of the seven predictors were performed. Because the differences in the multiple correlation coefficients and the standard errors of the predicted scores were extremely small for the seven, most of the six and most of the five variable equations it was decided to use one of the five variable equations to determine the individual scores and the score categories for the prediction table. Table 2 shows the multiple correlation coefficients and standard errors of the predicted scores based on seven variables, and the range of these measures based on all possible combinations of six and five of the predictor variables.

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* The author would like to thank Mr. Roy Hardy of the Department of Employment for his work in programming and computer analyses.

Table 2

Mutliple Correlation Coefficients (R) and Standard Errors of Estimate of Predicted Scores for the Equations Based on Seven, Six and Five Variables

Number of Variables	Range of R	Range of Standard Errors of Predicted Scores
7	.244	.464
6	.218 - .245	.464 - .467
5	.086 - .245	.464 - .477

Only one multiple correlation coefficient was under .200. In this equation both age at release to parole and age at admission to the Youth Authority were excluded. Most of the R's were within .010 points of each other. The five variable regression equation chosen had an R of .245 and the standard error of predicted scores was .464. The variables in this equation were age at first admission to the Youth Authority, age at release to parole, admission status, number of foster home placements, and number of co-offenders in the commitment offense. School misbehavior, and history of psychiatric or psychological evaluation, observation or therapy were excluded. With several five-variable equations with almost identical R's and standard errors, the one chosen excluded those two variables for which information was missing on the greatest number of wards in the 1963-64 construction sample. Because of the relative large weights carried by a few of the 7 variables, it is possible that regression equations producing similar multiple correlation coefficients and errors of estimate could have resulted from the use of particular groups of three or even two variables. However, such analyses were not done.

In order to obtain predicted scores, the optimal weights determined by the five-variable regression equation selected were applied to each female ward in

the 1963-64 parole release cohort for whom information on all five variables was available in punched cards. There were a total of 2,328 female wards released to California parole supervision in 1963-64. Of these, the 2,001 with information punched on all five variables were used to develop the prediction table.* The recidivism rate for the total 1963-64 release cohort (2,328) was 34.4 percent, while for the sample of 2,001 used the rate was 34.5 percent. The scores thus obtained (sum of the weights for each of the five variables multiplied by the ward's coded value for each variable) were distributed and the recidivism rates for each score calculated. The problem then becomes one of how to best group the scores to create a meaningful prediction table. The method used was to initially group scores into near equal size groups. The initial groups of scores attempted to define score categories containing approximately 100 wards each. The average number of wards in each initial score category was about 111 and the range was from 66 to 195.

After observing the recidivism rates for each score category a further grouping was done in order to produce a linear relationship between the score categories and their associated recidivism rates. This was necessitated by the many reversals in recidivism rates of adjacent score categories (Appendix A). Other considerations employed to produce the final prediction table were the number of wards in each score category and differences in recidivism rates among adjacent score categories.

The final prediction table, consisting of three score categories, was then applied to the 1965 cohort of female parolees, paroled to California supervision with information on all five predictor variables in punched cards. The 1965 cohort served as the validation sample for the tables developed on the 1963-64

*This differs from previous Youth Authority studies in that all subjects in the cohort were used. Missing data in these other studies was assigned a value corresponding to the modal category of the variable.

construction sample. The validation of any prediction instrument (in whatever form) on a sample different than the one on which it was developed, and one which is thought to be representative of the population on which predictions are to be made, is the fourth step of a prediction study as stated by Gottfredson (17).

RESULTS

Table 3 presents the relationships between each of the five selected predictor variables and the recidivist - non-recidivist criterion in the 1963 cohort, the 1964 cohort and in the combined cohorts. The five variables were those used in the regression equation upon which the prediction tables were based. Variables were categorized in a linear fashion with the exception of age at release for which the 16 year olds were combined with those 18 and older in one category and 17 year olds in another category. There was an attempt to categorize the variables so as to produce statistical significance. Categories of all variables, with the exception of the "Three or more" category of the number of co-offenders variable, contained substantial proportions of the sample.

Table 3

Relationships Between Selected Predictor Variables and the Recidivist - Non-recidivist Criterion For the 1963 Cohort, 1964 Cohort and Combined Cohorts

Variable	1963 Cohort				1964 Cohort				Combined Cohorts			
	Recidiv.		Non-Recid.		Recidiv.		Non-Recid.		Recidiv.		Non-Recid.	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Admission Status												
First	247	31.6	535	68.4	299	34.1	578	65.9	546	32.9	1113	67.1
One or more readmissions	122	41.2	174	58.8	139	37.3	234	62.7	261	39.0	408	61.0
	$\chi^2 = 8.86$ $p<.01$ d.f. = 1				$\chi^2 = 1.15$ $p>.10$ d.f. = 1				$\chi^2 = 7.84$ $p<.01$ d.f. = 1			
Number of Foster Home Placements												
None or one	251	32.7	516	67.3	299	33.1	603	66.9	550	33.0	1119	67.0
Two or more	61	41.2	87	58.8	85	42.9	113	57.1	146	42.2	200	57.8
Unknown*	57	35.0	106	65.0	54	36.0	96	44.0	111	35.5	202	64.5
	$\chi^2 = 3.95$ $p<.05$ d.f. = 1				$\chi^2 = 6.85$ $p<.01$ d.f. = 1				$\chi^2 = 10.83$ $p=.001$ d.f. = 1			
Number of Co-offenders in Commitment Offense												
None	210	38.6	334	61.4	271	37.4	453	62.6	481	37.9	787	62.1
One or two	100	30.7	226	69.3	120	33.4	239	66.6	220	32.1	465	67.9
Three or more	18	17.3	86	82.7	25	22.7	85	77.3	43	20.1	171	79.9
Unknown*	41	39.4	63	61.6	22	38.6	35	61.4	63	39.1	98	60.9
	$\chi^2 = 19.67$ $p<.001$ d.f. = 2				$\chi^2 = 9.59$ $p<.01$ d.f. = 2				$\chi^2 = 28.05$ $p<.001$ d.f. = 2			
Age at First Admission to the Youth Authority												
9 - 13	66	55.5	53	44.5	88	57.5	65	42.5	154	56.6	118	43.4
14	92	46.7	105	53.3	101	41.7	141	58.3	193	44.0	246	56.0
15	91	31.9	194	68.1	105	34.3	201	65.7	196	33.2	395	66.8
16 or older	120	25.2	357	74.8	144	26.2	405	73.8	264	25.7	762	74.3
	$\chi^2 = 55.68$ $p<.001$ d.f. = 3				$\chi^2 = 57.54$ $p<.001$ d.f. = 3				$\chi^2 = 111.3$ $p<.001$ d.f. = 3			
Age at Release to Parole												
9 - 14	52	53.6	45	46.4	69	60.0	46	40.0	121	57.1	91	42.9
15	86	45.7	102	54.3	101	44.3	127	55.7	187	45.0	229	55.0
16, 18 or older	171	30.8	385	69.2	197	31.7	425	68.3	368	31.2	810	68.8
17	60	25.3	177	74.7	71	24.9	214	75.1	131	25.1	391	74.9
	$\chi^2 = 38.5$ $p<.001$ d.f. = 3				$\chi^2 = 56.0$ $p<.001$ d.f. = 3				$\chi^2 = 93.6$ $p<.001$ d.f. = 3			

*Wards whose value for these two variables were unknown were not included in the chi-square analysis. They were also not used in the development or validation of the prediction tables.

All predictor variables except admission status were statistically significant at the .05 level of confidence or better in both 1963, 1964 and combined cohorts. Admission status was not significant at this level in the 1964 cohort.

Table 4 presents the weights for each of the five variables, the multiple correlation (R) between the predicted scores (estimate of the recidivism - non-recidivism criterion based on the weights) and the actual criterion, and the percent of the variance in the criterion accounted for by the variance in the predicted score (R^2).

Table 4

Individual Correlations (r), Multiple Correlation (R), Regression Weights (β) and Criterion Variance Explained (R^2) for the 1963-64 Construction Sample

Variable	r with Criterion	β	R	R^2
Admission Status	.057	254		
Number of Foster Home Placements	.033	-026		
Number of Co-offenders in Commitment Offense	.102	433		
Age at First Admission to Youth Authority	.216	487		
Age at Release to Parole	.194	854		
All five variables			.246	.060

It can be clearly seen that the strength of the relationships between the five carefully selected predictor variables and the criterion is quite small despite the large and highly significant chi-square values shown in Table 3.

This is reflected in the multiple correlation coefficient of .246, which shows that only 6 percent of the variation in the criterion (recidivism - non-recidivism) can be related to variation in the predicted scores (based on the optimal weights of the five predictors). The two age variables were the most highly correlated to the criterion but age at release to parole carried much more weight than age at admission in the regression equation. The low relationships shown in Table 4 is one factor in strongly limiting the administrative utility of prediction based on these variables.

Table 5 presents the prediction tables for the 1963-64 construction sample and the 1965 validation sample. The methods used to develop the score groupings have been described on pages 12-13. The last score category is a combination of three previously established groups, thus the very large N. They were combined because the differences among them were small relative to the differences between the first two score categories.

Table 5

Prediction Tables for Construction and Validation Samples

Score Category	1963-64 N	1963-64 Recidiv.	1963-64 Non-Recidiv.	1963-64 % Recidiv.	1965 N	1965 Recidiv.	1965 Non-Recidiv.	1965 % Recidiv.
2230-4284	439	239	200	54.4	240	123	117	51.3
4312-5166	428	156	272	36.4	241	87	154	36.1
5171-7399	1134	295	839	26.0	701	166	535	23.7
Total	2001	690	1311	34.5	1182	376	806	31.8

The prediction (base expectancy) tables show that the recidivism rates and the degree of differentiation of categories of wards is similar in the vali-

dation sample (1965) to that of the construction sample (1963-64). From this point of view, the table shows validity over different samples believed to be representative of a common population. However, the samples were groups released during 3 consecutive years (1963-65), and one does not know precisely how representative these cohorts are of previous and future groups of female Youth Authority parolees.

Wards with the highest probability of becoming recidivists (lowest score group) would most likely have the following combination of characteristics: 15 or younger at time of parole; 14 or younger at first admission to the Youth Authority; no co-offenders in the commitment offense; and a previous parole violator while under Youth Authority jurisdiction. Wards with the lowest probability of becoming recidivists (highest score group) would most likely have the following combination of characteristics: 16 or older at time of parole; 15 or older at time of first admission to the Youth Authority; one or more co-offenders in the commitment offense; a first admission to the Youth Authority (no previous parole violations).*

In general, the prediction tables show some ability to differentiate groups of wards with respect to their probability of being a recidivist or non-recidivist within 15 months of release to parole. The uses and limitations of this and similar kinds of prediction tables will be discussed in the last section of the report.

It is difficult to choose one statistical method to evaluate the pre-

*The possession of all characteristics listed is not necessary to fall in the highest or lowest score category. However, age at release to parole, which carries the most weight in determining the predicted score and is correlated with age at admission, which carries the second greatest weight, would have to be as described above in order for wards to fall into the highest or lowest score group. Number of foster home placements carries a negative weight. However, it has the lowest weight and contributes relatively little to the predicted score (see Table 4, page 17).

diction table. Gottfredson (17) has cited several studies which use different methods. However, the most important determinant of how a prediction instrument is to be judged is the use to which it is to be put. This involves what decision or decisions will be affected by the prediction table. Among the possible factors which should be considered are: the selection ratio, "costs" of wrong prediction, the relationship between the decision made on the basis of the prediction table and the outcome of such a decision, the base rate of the criterion to be predicted, the efficiency of the prediction table over other means of making the decision, the validity of the table with respect to the population to which it is to be applied, etc.

It may be of some interest to statistically evaluate the prediction tables in Table 5 with other tables developed for female parolees shown in Table 1 without regard to how the tables are to be used in decision-making. This will provide some kind of comparison among different prediction tables in terms of a statistical measure. One easy-to-understand measure is called the index of predictive association developed by Goodman and Kruskal (15). In essence, this index measures the amount of error reduction in prediction using the table over what would be made by placing all subjects in the criterion category with the greatest proportion. The highest proportion of wards are in the non-recidivist category. Thus, without any knowledge other than this, all wards would be predicted to be non-recidivists. Using the prediction table for the 1963-64 construction sample, and predicting all wards in the lowest score category as recidivists, since more than 50 percent in this category are recidivists, and all wards in other two score categories as non-recidivists, would result in a 5.6 percent error reduction over that obtained by predicting all wards as non-recidivists. In the 1965 validation sample use of the prediction table would result in a 1.6 percent reduction in error over a strategy of

predicting everyone as a non-recidivist.

The prediction tables developed for female releasees from the California Institution for Women, by Gottfredson, Ballard and Bonds (20), showed no score category with more than 50 percent recidivists, thus there would be no error reduction in using the table over that made by predicting everyone as a non-recidivist. The parole expectancy table (using personality test and institutional behavior variables) developed by Gottfredson and Ballard (18) using CIW releasees shows only one of the six score categories (the one with the smallest number of releasees) with more than 50 percent recidivists. The error reduction measured by the index of predictive association would be very small. In the same authors' prediction table based on three categories of offender-type, none of the three showed a recidivism rate of more than 50 percent, thus resulting in an error reduction of 0 percent. In Bohnstedt's study (9) using suspension of parole within one year as the criterion of recidivism, the five category prediction table showed an error reduction of 17.6 percent over that which would have been obtained by predicting all wards as non-recidivists. It should be noted that the closer the base rate is to 50 percent the greater the probability that a prediction table will be able to show error reduction. In the Bohnstedt study 47 percent of the sample were recidivists, while in the present study as well as those by Gottfredson and his associates the percent of recidivists was less than 35 percent.

In the construction sample a prediction table based solely on age at admission (using the same categories as in Table 3) would result in a 4.4 percent reduction of error, and one based solely on age at release to parole alone (using the same categories as in Table 3) would result in a 3.7 percent reduction of error using the index of predictive association. It is apparent that most of the small amount of error reduction in the 1963-64 table is due to

the age variables.

In an unpublished study by Babst and Glaser (1), a measure called the mean cost rating (MCR) was used to compare prediction tables. This measure takes into account the sum of the proportions of predictive failures (non-recidivists who would be rejected at each score category) and the sum of the proportions of predictive successes (recidivists who would be rejected at each score category). Rejection refers to a particular classification, selection, or placement decision. The MCR can vary from 0, where all score categories of a prediction table have the same proportion of recidivists, to 1, where the score categories contain only recidivists or non-recidivists (maximum discrimination). The MCR for the 1963-64 (construction sample) table was .249, while for the 1965 (validation sample) table it was .251, which shows that both tables have limited ability to separate recidivists and non-recidivists.

In summary, the index of predictive association and the mean cost rating show rather limited predictive ability for the tables developed on the 1963-64 and validated on the 1965 cohorts. The index of predictive association shows that the tables do not allow one to identify large proportions of wards with rates of recidivism above 50 percent, and the mean cost rating shows that the score categories which make up the tables contain high proportions of the total number of both recidivists and non-recidivists. It should be noted, however, that prediction instruments even with the limited statistical predictive power shown here may nevertheless have utility in selection, classification or placement decisions. The extent of such utility depends upon several factors concerning the decision and its consequences, including: "costs" of wrong decisions made using the table, the selection ratio (the proportion of the group to be paroled or otherwise selected for some "treatment"), the importance of classifying those who will become recidivists as opposed to total accuracy (correctly classifying <u>both</u> recidivists and non-recidivists), etc.

DISCUSSION

The topics to be discussed in this section are: 1) the relationships between the two age variables and recidivism; 2) the uses and limitations of prediction tables in corrections; and 3) a model for evaluating utility of prediction tables.

Age and Recidivism

The two age variables, age at first admission to the Youth Authority and age at release to parole showed the highest relationships with the recivist - non-recidivist criterion and also contributed the greatest amount to the predicted score. The Pearson product moment correlation coefficients were .194 and .216 in the 1963-64 construction sample and .192 and .191 in the 1965 validation sample for age at admission and age at release, respectively. Age at admission is related in a negative and linear manner to recidivism rates, showing the older the ward the lower the recidivism rate up to and including the age of 16. Age at release to parole is related in a similar manner but shows some non-linearity at the higher age groups; the 17 year olds have a lower recidivism rate than those 18 years old or older. The 18 and older group were combined with the 16 year olds because of the similarity in recidivism rates. These two variables were important predictors in the study by Bohnstedt (9). In the study by Gottfredson, Ballard and Bonds (20) age at first arrest was correlated .17 to their recidivism criterion and also contributed to the regression equation.

Age at first admission and/or age at release to parole have been found among the most powerful and consistent predictors of recidivism among Youth Authority males (3, 4, 7). Similar relationships between age and recidivism for both male and female juvenile parolees have been shown in other states (14). The relative strength and consistency of these relationships call for some

explanations to account for them. Age at first admission and similar variables dealing with the age at which the girl first came to the attention of law enforcement and/or other correctional agencies probably involves one set of factors, whereas age at release another, somewhat different, set of factors which influence whether or not the girl becomes a recidivist. Since both age at first admission and age at release are correlated with each other (.591 and .577 in the 1963-64 and 1965 cohorts, respectively) both sets of factors probably work in the same direction.

Several possible explanations for the relationship between age and recidivism rate will be stated. The first set of explanations will deal with the relationship between age at admission and recidivism rate. It should be noted that each of the explanations contain several assumptions which may be unstated, and that a complete causal network linking age and recidivism rates is not spelled out. In addition, the explanations do not exhaust other possible explanations or variations of the ones presented.

1. Age at admission may be an indicator of the age of the development of behavior patterns and attitudes leading to delinquent behavior. The earlier in one's life such a pattern has developed the more resistant it may be to change, and thus the more likely the girl is to continue to commit delinquent acts. Conversely, the older the girl is at time of first admission the less likely the behavior and attitudes leading to delinquency was developed at an early age. The later the development of these behavior and attitude patterns, the less likely it may be for the delinquency to continue, and the more likely new opportunities available to older adolescents and young adults, such as marriage and raising a family, are to counter or eliminate forces leading to delinquency.

2. The younger the girl is when involved in a correctional agency, especially if she is incarcerated, the more likely such an experience will have negative effects upon the girl's self-image and expectations, leading to a continuation of patterns and attitudes which often result in delinquent behavior. This explanation, as the first, stresses the importance of the early adolescent or pre-adolescent years for solidifying patterns of behavior, attitudes, etc., which lead to delinquency. Conversely, experience in a correctional institution is less likely to have

negative impact (with respect to delinquent behavior) or more likely to have a positive impact upon the older adolescent girl. It is assumed that the older adolescent girl, at time of first commitment to the Youth Authority, has concepts about herself and others which are somewhat more permanent and resistant to the potential negative effects of institutionalization.

3. The younger the girl is when admitted to the Youth Authority, the more likely she is to come from a seriously disturbed home and community situation. It is assumed here that many of the offenses which lead to commitment to the Youth Authority do not necessarily require incarceration away from the home and community, especially among young females. Many of the commitment offenses are listed under the Welfare and Institutions Code rather than under the penal code. Thus, commitment to the Youth Authority may reflect the judgment of the inadequacy or danger of the home situation for the girl, especially among younger girls. If these assumptions are true, one may further assume that an inadequate home environment has greater deleterious effects upon behavior and general development of the younger girl. Thus, there is probably less potential for rehabilitation by the Youth Authority and a greater likelihood of return to a more unfavorable environment than for older girls.

All three explanations concern the importance of the developmental period in the girl's life when delinquency begins and the subsequent effects of this earlier delinquency on future behavior.* The explanations also recognize that

*An alternative approach to the problem of explanation of the relationship between age at first admission and recidivism has been proposed in a private communication by Doug Knight, Youth Authority researcher. He claims that it is probably misleading to search for causal sequences (involving developmental problems, etc.) to account for the general linear relationship between age at first admission (or similar variables) and recidivism. He states that one may consider age at first admission to represent "successful years without commitment", i.e., increasing age to represent groups of offenders who have been "successful" for longer periods of time. If each successive age group represents an increasing bias toward "successful" experience (with respect to staying out of the Youth Authority) then it should not be surprising that, on a group basis, the differential risk of "getting into trouble" maintains itself for the follow-up period after being released on parole. The greatest economy of explanation is achieved by simply positing that the longer a youth can "keep out of trouble" the lower the probability of "more trouble" in the immediate future. This approach which Knight presents has some merit with regard to parsimony but seems to imply that no further explanation is needed. The general idea that the best predictor of future behavior is past behavior, which is the basis of Knight's approach, should not put an end to inquiry about the behavior in question, nor the search for other levels of explanation.

age may be an indicator of the strength and persistence of the forces leading to delinquency and its continuation. It should be obvious that all three explanations are not mutually exclusive.

The relationship between age at release to parole and recidivism rates is similar to that between age at admission and recidivism rates, with the exception of the non-linearity at the higher ages (see Table 3 and page 15). However, since recidivism rates of girls 16, 17 and 18 or older when released to parole are much lower than both the 15 year olds and those 9 to 14 (see Table 3) the relationship may be considered linear using the categories 9-14, 15 and 16 or older. The correlations between age at admission and age at release to parole (see page 24) suggest that the same explanations proposed for age at admission may be partial explanations for the relationship between age at release and recidivism rates. In general, the younger the girl at admission, the younger when released to parole and vice versa, especially among first admissions. Some hypotheses more specific to age at release are:

1. Younger parolees commit more delinquent acts than older parolees.

2. Misbehavior which often leads to revocation may be more easily detected in younger parolees than in older parolees. This assumes that the age groups do not necessarily differ in the amount of delinquent activity which could lead to revocation, but rather in the ease of detection by law enforcement, parole agents or others.

3. Older girls are more likely to have more alternatives to Youth Authority incarceration after violating parole, such as independent living, marriage or a job. Authorities may see these and other resources as help to the older parolee and thus would be somewhat less likely to revoke her. If explanation three on page 25 has validity, the younger parolee is less likely to have a home situation seen as helpful to her in community adjustment.

4. There is a differential reaction of the community, law enforcement and the Youth Authority to misbehavior of parolees which is partly a function of the age of the parolee. Such misbehavior may be seen as more serious for a younger girl than an older girl. The younger girl may be seen as in more need of custodial care than an older girl when misbehavior occurs, even if only for her own protection.

Again, these explanations serve to supplement each other as well as the explanations presented for the relationship between recidivism rates and age at admission. Many of the explanations and the hypotheses built into them can be subjected to empirical research. Data contained in records kept for Youth Authority wards may be used to test some of the ideas contained in explanations 1 and 3 for age at first admission, and explanations 3 and 4 for age at release to parole.

The correlations between the other three predictor variables used to determine the scores in the prediction table and recidivism are very small in comparison with the correlations of the age variables and recidivism (see Table 4). The author does not feel that these relationships merit speculation as to their causes. This is not to deny that admission status, number of foster home placements, and number of offense partners may have some causal significance in whether or not a girl becomes a recidivist, but that such significance is minor.

Uses and Limitations of Parole Prediction Tables

The uses and limitations of prediction tables in a correctional setting have been discussed by Gottfredson and Ballard (18), Beverly (6), Evjen (12),

Glaser (13), Grant (23), Powers (26) and others. Some of the major arguments for and against the use of prediction tables will be summarized. Some of the stated uses of parole prediction tables are:

1. They provide information for testing ideas concerning what kind of people, in terms of defined characteristics, have high, average and low rates of recidivism. Prediction tables based on statistical weighting techniques such as multiple regression or discriminant fuction provide information on the relative importance of various factors in identifying groups of individuals with varying rates of recidivism. Beverly (6) suggests that the informative role of prediction tables may function to answer theoretical questions concerning the development of deviant behavior, and provide basic knowledge which is necessary in order to effect changes in these behaviors.

2. Prediction tables create an awareness of the need to collect data on the relationships between offender characteristics, background data, institutional experiences and recidivism. Changes in the population coming into a correctional agency or into a particular facility with respect to recidivism-related variables as well as changes in the relationships of different variables to recidivism may be studied (6).

3. Prediction tables aid research on program evaluation by providing a meaningful "control" variable (or co-variate) with which to match groups or select groups on the basis of probability of recidivism. Beverly (6) and Gottfredson and Ballard (18) have discussed and stressed this use for prediction tables. Another research use is the determination of base line or expected rates of recidivism with which actual recidivism rates can be compared, allowing the effects of programs or other changes to be evaluated. Beverly (5), and Beverly and Guttmann (8) have done this using Youth Authority facilities as units of analysis for comparisons of expected and actual rates of recidivism.

4. Prediction tables help decision-makers use objective evidence from past experience in making parole decisions. The implication is that the use of prediction tables will result in better decisions with regard to the goals of the agency as well as the offender than those made without use of prediction tables.

The first two uses listed can be considered the informational use of prediction tables (6) and may be valuable to a correctional agency in terms of defining and modifying basic assumptions on which both long range and short range policies are made. The third use has been termed the evaluative use by Beverly (6) and refers mainly to the research function of a correctional agency.

The fourth use had been called the administrative use (6) and as stated here concerns prediction tables and specific decisions about offenders. The role of prediction tables in specific decision-making is the most controversial, and the one that has been subject to the greatest amount of criticism.

Among the reasons stated against the use of parole prediction tables (or advocating limitations in their use) are (6, 12, 13, 18, 26):

1. Most prediction tables are based on large numbers of parolees. The score categories (risk groups) are based on aggregate data. These score categories with their associated rates of recidivism may not accurately apply to any particular individual in that category who is the subject of concern in making decisions.

   a. The application of prediction tables based on large numbers of parolees with a wide range of institutional and parole experiences to specific groups within the population may not be as predictive as its application to a representative sample of the entire population on which the tables were developed. Gottfredson and Ballard (18) and Beverly (6) have discussed this weakness of prediction tables. Gottfredson and Ballard (19) have used multiple regression to develop prediction tables for relatively small groups of parolees homogeneous on several background variables to attempt to make prediction more relevant to specific, definable groups within the total parolee population. However, Beverly (7) found that separate multiple regression equations for Youth Authority male parolees who were first admissions and for those who had a previous parole violation did not result in greater multiple correlation coefficients than an equation developed for the combined group.

2. Decisions about offenders should take into account information and human judgments not included in most parole prediction tables. This may include background, institutional and post-institutional information concerning the offender. The basic argument here is that one should not rely solely on statistical data to make important decisions about human beings, such as granting or denying parole.

3. The use of prediction tables to make parole decisions reduces the functions and responsibilities of parole boards and other similar decision-making groups. Decisions based on prediction tables may go counter to established policies, statutes or community sentiment.

4. Prediction tables are often based on statistics which are not very highly related to the criterion. Some tables do not contain score categories with recidivism rates close to 0 percent or 100 percent. There is often a score category which contains a large group of parolees whose recidivism rate is close to the overall rate in the entire group. The argument here is that prediction tables do not provide enough statistical discrimination to be useful in making parole decisions.

5. Prediction tables, as presently constructed, do not suggest program or time of release, only the probability of recidivism.

6. Prediction tables based on parolees from one correctional agency cannot be assumed to be valid for parolees from other correctional agencies.

7. The recidivism criterion has many weaknesses in terms of accurately indicating criminal behavior after release to parole. Recidivism involves the entire spectrum of deviant behavior. The possible type of behavior resulting in being classified as a recidivist is not taken into account by prediction tables.

Evaluating a Prediction Instrument

Most of the arguments, both positive and negative, have merit. The evaluation of a prediction instrument must be done, as previously mentioned, in terms of the context of the decisions to be made. One cannot simply look at statistical measures such as the index of predictive association or mean cost rating, as presented on pages 20-22 and then decide whether or not a prediction table can be useful, or how it should be used. Such measures as the validity coefficient or the statistical significance of the differences in the recidivism rates among the score categories of a prediction table do not provide, by themselves, definitive ideas on the use of a prediction table. Although these statistical measures are important, other types of analyses are probably more pertinent in determining, in a particular context, the utility of prediction tables or other selection and classification instruments. The discussion immediately following will concentrate on the administrative (decision-making) functions of prediction instruments not on their informational or research functions. The latter two functions will be briefly discussed at the end of the report with regard to the tables developed here.

In the book "Psychological Tests and Personnel Decisions" by Cronbach and

Gleser (10), the authors present an analysis of selection decisions in terms of mathematical decision theory. The important concepts they use revolve around the utility of a set of decisions using a prediction or selection instrument. Utility is a function of: 1) the number of persons about whom the decisions are to be made; 2) the value of the outcomes (payoff) of assignment of different people to different conditions by means of the instrument; 3) the strategy involved in using the instrument to assign people to different conditions or treatments; and 4) the cost of gathering the information. The decision strategy which produces the greatest utility is to be preferred. In this approach, a value is placed on each possible outcome (result) of the decisions made, using the prediction instrument in a particular manner (strategy). The probabilities of each evaluated outcome (payoff) for a particular decision strategy are computed. The evaluated outcomes include "bad" or "wrong" decisions and their consequences.

It is assumed that different decisions (assignment to different conditions) lead to different payoffs as a function of the information contained in the prediction instrument. If all decisions lead to the same payoff, or if there are no differential conditions (treatments) to which people can be assigned using the prediction instrument, such an instrument would be useless. For example, in order to show any utility, the payoffs for offenders in one score category of a prediction table should be greater if assigned to one condition rather than another. Parole versus continued institutionalization may be considered as different conditions.

In order to evaluate a prediction instrument by means of the equations presented by Cronbach and Gleser (10), it is necessary to quantify outcomes, the payoffs (value for each outcome), the decision strategy, the probabilities of each possible payoff, and the costs of gathering the information used in the

instrument. The quantification of some of these variables in a correctional setting may be very difficult, and best guesses may be all that are feasible.

By means of equations and payoff functions Cronbach and Gleser show how various prediction instruments may be compared, and how payoffs resulting from the use of a prediction instrument may be compared against payoffs of decisions made without the use of such an instrument. The latter comparison is probably most relevant to the correctional situation. In addition, the authors show how the utility of a prediction instrument may be evaluated under different conditions, such as: single stage versus sequential use, fixed versus adaptive treatments to which an individual can be assigned, and various selection ratios (the proportions of people who can be assigned to the various "treatments" available).

In a correctional setting it is often difficult to obtain quantitative measures for the variables involved in the utility equations presented by Cronbach and Gleser (10). Some of the information required, such as payoff, is often not known. There are several factors (whether quantified or not) that should be considered in evaluating the use of a parole prediction instrument. They are:

1. The goals of the agency - both explicit and implicit goals.
2. The decisions which may involve the use of the prediction table.
3. The constraints within which such decisions are made.
4. How the prediction table will be used in the decision-making process. This is the decision strategy.
5. The results of decisions made using the prediction table (outcomes).
6. The values these results have with respect to the goals (payoff).
7. How these evaluated outcomes compare with the evaluated outcomes of decisions made without the prediction table.
8. The policy changes that may result from the use of the prediction table.

The use of parole prediction tables should contribute to the goals of the agency. Some of these goals may include: reducing recidivism, reducing costs, maintaining a smooth flowing operation, adhering to community and law enforcement wishes concerning some offenders, presenting a favorable image to the public, and others. More specific goals may involve the specific number of offenders who may be paroled, the "acceptable" rate of recidivism, the prevention of violent crimes, and the release of the maximum number of offenders from institutions, consistent with other goals and statutes. The administrator and researcher must evaluate the results of the use of prediction tables in light of these goals and in terms of the effects on all parts of the correctional system.

To what decisions can a prediction table be applied? This should be based on the statistical relationships of the table to the outcomes of the decision. Among some of these decisions are: granting or denying parole, assignment to programs, selection of special groups, and early release. An important consideration is whether or not the prediction table will be used for routine decisions for most offenders or only in special situations for a small number of offenders. The latter is probably more realistic because of some of the reasons against the use of prediction tables for administrative decisions listed on pages 29 and 30. Whether or not the prediction table is used alone or together with other information and judgment of officials is another factor in determining to what decisions prediction tables can apply.

Decisions in a correctional agency are made within many constraints, both explicit and implicit. Some of these constraints are: financial and staff resources; community and law enforcement feelings about certain offenders or groups of offenders; the number of offenders institutions and parole can handle; the nature of special programs such as those which require small parole case-

loads; the number and effectiveness of alternatives available (different programs); the implicit functions of a correctional agency to separate and punish offenders; political pressures; and the laws within which correctional agencies operate. These constraints bear directly or indirectly on paroling policies, thus restricting some possible uses of prediction tables in making parole decisions.

The decision strategies are the specific operations by which prediction tables are employed to make the decisions. This involves the determination of cutting points or score categories above or below which some decision about the offender, or group of offenders, is made. Other aspects of the decision strategy are: whether or not, and at what point in the decision process, other information is used; single stage versus sequential process (whether or not the prediction table is used to initially screen a group with the final decision made on the basis of other information or vice versa) and; how the prediction table is to be combined with other information and judgments to determine final decisions. Beverly (6) suggests that prediction tables might be used as a first stage screening device to choose those with a low probability of recidivism whom subjective selection may have overlooked. He further suggests that those so screened be considered against other criteria for a final decision whether or not to parole. Duncan, Ohlin, Reiss and Stanton (11) present various mathematical strategies for making two-choice decisions using an instrument such as a prediction table. The various strategies they describe lead to different outcomes, such as: maximizing efficiency over using the base rate to make decisions, maximizing efficiency considering the cost of making errors (choosing for parole one who will become a recidivist and rejecting for parole for one who will not become a recidivist), and selecting a group with a fixed proportion of wrong decisions. The particular strategy chosen will vary with the goals of

the agency and the constraints described previously. The decision strategy may be varied by using the prediction table in several different ways. This can be done mathematically, in some instances, by making the necessary estimates of the outcomes.

The key factor in using a prediction instrument relates to the outcomes associated with its use. Some are: recidivism rates for groups selected to be paroled or for some program, recidivism rates for all offenders, costs, number of "serious" crimes, staff morale, development and maintenance of special programs, number of offenders to be paroled, change of length of stay in institutions, and public acceptance of the agency's policies. Many of the outcomes of using prediction tables are not known. Much experimentation is needed to relate the various decision strategies using prediction tables to outcomes. Most parole prediction tables are developed for large samples of earlier groups of parolees who were paroled under many different conditions and to all types of programs, and do not show the results of using them to make decisions.

A study using predicted scores to determine outcomes has been reported by Havel (25). A group of parolees from the California Department of Corrections with a low probability of recidivism as determined by a prediction table, were given minimal parole supervision. A comparison group of parolees also showing low probability of recidivism were given standard parole supervision. The two groups showed very little difference in arrests, return to prison, etc. Although the outcomes did not differ with regard to recidivism, the outcomes differed with regard to costs and allocation of staff resources.

The outcomes must be given some value in light of the goals of the agency. In this manner both the positive and negative consequences of using a prediction instrument may be considered in order to come up with some overall value statement about each possible outcome. Part of the determination of the value

for each outcome will be the priorities assigned to the several goals of the agency. One specific outcome of using a prediction table may foster one goal but be in conflict with another goal. For example, one goal of a correctional agency would be quicker reintegration of the offender in the community, through parole, while another may be keeping costs and the load placed on the parole system down. The use of a prediction table may produce outcomes which foster the first goal but go contrary to the second one. The values placed on the outcomes of the use of prediction tables will be extremely important in whether or not they are used and in what manner they are used.

Once the outcomes are evaluated the next step is to compare them with the outcomes of decisions not using the prediction table. The comparison of different decision strategies with each other, and with the non-use of prediction tables, is the final logical step in evaluating a prediction instrument. The utility functions developed by Cronbach and Gleser (10) is one method of making these comparisons. Without the specific knowledge needed to solve these equations, other methods using both quantitative information and administrative judgments can be employed in making the comparisons. The author believes that considering the relationship of prediction tables to the criterion of recidivism and the constraints involved in making parole decisions, prediction tables will show little utility over present methods of making decisions. Although prediction tables may have utility in specific situations, their use in making routine parole decisions for large numbers of offenders will probably not show much advantage over methods of making decisions without the use of prediction tables.

A potential result of prediction tables is change in policies of the agency. For example, offenders who were previously thought unamenable to parole or early parole because of their offenses or prior criminal record may

be shown to have a low probability of recidivism by a prediction table. Prediction tables may also provide some informational support for new programs and innovations, such as reduced parole supervision for some groups. Statistical and experimental approaches to corrections, of which prediction tables are one aspect, have tried to orient decision-makers and policy planners to a more objective, less tradition-bound viewpoint. Perhaps the role of prediction tables in contributing to a more "scientific" approach to corrections is their main function.

Despite the possibilities for the use of prediction tables mentioned previously, the author sees very little utility for the prediction table for female wards developed in this report. This is especially true of its utility in making routine, individual parole decisions. Almost all wards are paroled, and the length of time spent in institutions does not vary greatly as it does for adult inmates of correctional facilities where the law provides sentences of from 2 to 10 years, 5 years to life, etc. For adult inmates, decisions whether to grant or deny parole have much more individual, monetary and social consequences than in the Youth Authority where the average length of institutional stay for female wards is 9 months.

Selection of wards for special programs involving shorter institutional stay or direct release from the reception centers is based on factors other than the statistical probability of recidivism. Among these factors are: judged suitability of the parole placement; community resources for the girl; judged seriousness of the offense; and community reaction to the girl. It is doubtful that a prediction table, such as the one developed here, can provide additional information leading to better decisions with regard to early release (better in terms of some agreed upon measure of outcome). In addition, the relationship between the score categories of the prediction table and outcome for "special"

programs is not known. Prediction tables based on variables used in this study may not be the most relevant in predicting differential response to programs.

With respect to the use of prediction tables in the matching or selecting of groups (experimental and control) on the basis of predicted scores (or score categories), the tables presented in this report do not contribute a much greater amount of statistical control than that exerted by either one of the age variables alone. The researcher working with female Youth Authority wards who wants to match or select groups on the basis of probability of recidivism would do almost as well to use age at first admission or age at release to parole than go through the extra effort of using the score categories based on all five variables.

The prediction tables for female Youth Authority parolees can serve in an informative and heuristic manner. Findings of correlates of recidivism as well as relative weights of the various factors should aid in an attempt to explain why some girls become recidivists and some do not. The relatively low relationships between selected individual variables and the recidivism criterion, as well as between the combination of these variables in the multiple regression equation and the criterion, should point to either the search for different predictors or to the realization that the recidivism criterion may include many factors that are not predictable. Variables dealing with the community to which the parolee is released may provide some increase in the predictability of recidivism.

The author believes that recidivism - non-recidivism, although an objective criterion in the sense of the specific operations which define it (whether or not a ward's parole is revoked, or the ward is discharged from a suspended parole status), is an unreliable criterion in the sense that there may be

unknown or non-identifiable factors which go into the commitment of an offense, as well as the decisions to suspend and revoke parole. In a recent article, Woodring (28) questions the recidivist - non-recidivist criterion as a proper measure of rehabilitation of delinquents. He claims that being a recidivist or a non-recidivist does not necessarily indicate psychological changes, or lack of changes, in the individual which constitute rehabilitation.

Unknown and perhaps inconsistent factors, determine who does and doesn't become a recidivist far more than the characteristics of the ward generally used as predictors, or interact in some unknown manner with these characteristics. Inconsistent factors refer to those sometime correlates of the recidivism criterion which change from year to year, sample to sample, etc. A relatively small number of variables have been shown to be related to recidivism over time and different samples. The difference between the many statistically significant relationships found by Guttmann in the 1961-62 sample and the few statistically significant relationships found in the 1963-64 sample may be interpreted, in part, as being due to the inconsistency residing in the recidivism criterion.

The unknown factors operating to determine who does and does not become a recidivist may include some that are not measurable and not relevant to all subjects. The major determinants of recidivism may be a conglomerate of characteristics and circumstances which are somewhat unique for each ward. Thus, the prediction of recidivism for individuals probably is greatly limited by by the nature of the criterion.

REFERENCES

1. Babst, Dean V. and Glaser, Daniel, Developing and Testing Configural Tables for Males Paroled from the California Adult Authority. Unpublished Paper 1968.

2. Babst, Dean V., Gottfredson, Don M., and Ballard, Kelley B., Comparison of Multiple Regression and Configural Analysis Techniques for Developing Base Expectancy Tables. J. of Res. in Crime & Delinq., Jan. 1968, 72-80.

3. Beverly, Robert F., A Method of Determination of Base Expectancies for Use in the Assessment of Effectiveness of Correctional Treatment. State of California, Department of the Youth Authority, Division of Research, Report No. 3, Feb. 1959.

4. _____, Base Expectancies and the Initial Home Visit Research Schedule. State of California, Department of the Youth Authority, Division of Research, Report No. 37, Jan. 1964.

5. _____, An Analysis of Parole Performance by Institution of Release (1959-1962). State of California, Department of the Youth Authority, Division of Research, Report No. 40, March 1965.

6. _____, A Discussion of Some Problems Related to the Meaning and Proper Use of Base Expectancies in a Correctional Agency. Unpublished Paper, Jan. 1966.

7. _____, A Comparative Analysis of Base Expectancy Tables for Selected Subpopulations of California Youth Authority Wards. State of California, Department of the Youth Authority, Division of Research, Report No. 55, Dec. 1968.

8. _____, and Guttmann, Evelyn S., An Analysis of Parole Performance by Institution of Release (1956-1960). State of California, Department of the Youth Authority, Division of Research, Report No. 31, Nov. 1962.

9. Bohnstedt, Marvin A., Determination of Base Expectancies for Female Youth Authority Wards. State of California, Department of the Youth Authority, Research Report No. 8, Aug. 1958.

10. Cronbach, Lee J. and Gleser, Goldine C. Psychological Tests and Personnel Decisions. Urbana: University of Illinois Press, 1965.

11. Duncan, Otis, D., Ohlin, Lloyd E., Reiss, Albert J., and Stanton, H. R., Formal Devices for Making Selection Decisions. Amer. J. Sociol., 1953 58, 573-584.

12. Evjen, Victor H., Current Thinking on Parole Prediction Tables. Crime and Delinquency 8, July 1962, 215-238.

13. Glaser, Daniel., Prediction Tables as Accounting Devices for Judges and Parole Boards. Crime and Delinquency, 8, July 1962, 239-258.

14. Glaser, Daniel and O'Leary, Vincent. Personal Characteristics and Parole Outcome. U. S. Department of Health, Education and Welfare, Office of Juvenile Delinquency and Youth Development, 1966.

15. Goodman, Leo A., and Kruskal, W. H., cited in Hays, William L., Statistics for Psychologists. New York: Holt, Rinehart and Winston, 1963.

16. Gottfredson, Don M., A Shorthand Formula for Base Expectancies. State of California, Department of Corrections, Research Division, Report No. 5, July, 1962.

17. _____, Assessment and Prediction Methods in Crime and Delinquency, in Task Force Report: Juvenile Delinquency and Youth Crime. The President's Commission on Law Enforcement and Administration of Justice, Washington: U. S. Government Printing Office, 1967, pp. 171-185.

18. _____, and Ballard, Kelley B., Prison and Parole Decisions/A Strategy for Study. Sacramento: Institute for the Study of Crime and Delinquency, June 1965.

19. _____, and _____, Offender Classification and Parole Prediction. Institute for the Study of Crime and Delinquency, Dec. 1966.

20. _____, _____, and Bonds, Jack A. Base Expectancy, California Institution for Women. State of California, Department of Corrections, Research Division, Report No. 15, Sept. 1962.

21. _____, _____, and Lane, Leonard. Association Analysis in a Prison Sample and Prediction of Parole Performance. Sacramento: Institute for the Study of Crime and Delinquency, Nov. 1963.

22. Gottfredson, Don M., Ballard, Kelley B., Mannering, John, and Babst, Dean V., Wisconsin Base Expectancies for Reformatories and Prisons, cited in Babst et. al., reference number 2.

23. Grant, J. Douglas, It's Time to Start Counting. Crime and Delinquency, 8, July 1962, 259-264.

24. Guttmann, Evelyn S., A Comparison of Youth Authority Boys and Girls; Characteristics and Their Relationship to Parole Violation. State of California, Department of the Youth Authority, Division of Research Report No. 45, June 1965.

25. Havel, Joan., Special Intensive Parole Unit Phase Four, The High Base Expectancy Study. State of California, Department of Corrections, Research Division Report No. 10, June 1963.

26. Powers, Sanger B., Standard Parole Prediction Methods - Views of a Correctional Administrator. Crime and Delinquency, 8, July 1962, 270-275.

27. Wilkins, Leslie T., and MacNaughton-Smith, P. New Prediction and Classification Methods in Criminology, J. of Res. in Crime and Delinquency, 1, Jan. 1964, 19-32.

28. Woodring, Thomas M. A Dilema: Rehabilitation and its Relationship to Recidivism. Youth Authority Quarterly, 22, Winter 1969, pp. 3 - 8.

APPENDIX A

Prediction Tables for Construction and Validation Samples

Score Category	1963-64 Number	1963-64 Recidiv.	1963-64 Non-Recidiv.	1963-64 Percent Recidiv.	1965 Number	1965 Recidiv.	1965 Non-Recidiv.	1965 Percent Recidiv.
2230-2943	104	74	30	71.2	71	39	32	54.9
2971-3404	110	50	60	45.5	72	36	36	50.0
3430-3825	115	61	54	53.0	51	26	25	51.0
3837-4284	110	54	56	49.1	46	22	24	47.8
4312-4338	102	40	62	39.2	57	19	38	33.3
4371-4691	86	37	49	43.0	50	16	34	32.0
4705-5117	120	39	81	32.5	85	37	48	43.5
5145-5166	120	40	80	33.3	49	15	34	30.6
5171-5399	121	33	88	27.3	89	20	69	22.5
5404-5625	95	36	59	37.9	56	12	44	21.4
5653	195	52	143	26.7	122	31	91	25.4
5658-6032	132	41	91	31.1	93	29	64	31.1
6086	129	27	102	20.9	89	15	74	16.9
6112-6479	69	16	53	23.2	43	9	34	20.9
6507	149	38	111	25.5	74	22	52	29.7
6519-6712	91	20	71	22.0	59	14	45	23.7
6940	87	21	66	24.1	48	7	41	14.6
6966-7399	66	11	55	16.7	28	7	21	25.0
Total	2,001	690	1,311	34.5	1,182	376	806	31.8

END