The Continuum of Care System: Decision Support for Practitioners

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INTRODUCTION

The Continuum of Care system[1] began several years ago as a research project to study the differences among children placed in various types of out-of-home care, e.g.:, foster family care, basic child care, group homes, and residential treatment centers. One of the project's initial goals was to examine the feasibility of developing a computer model of the residential child care service delivery system, based on the characteristics of a sample of children admitted to each of the different types of residential care facilities.

The statistical technique of discriminant analysis and classification was found to do a better-than-expected job of differentiating children in the individual facilities providing different types of care. Moreover, the model's classifications of individual children into particular facilities were judged by practitioners expert in the field of child placement to be appropriate to the service needs of children.

Based on these findings, two software packages were developed to provide child placement practitioners with direct access to this information. The first software package, MATCH, enables practitioners to interactively enter the characteristics of a child in need of residential care and, in seconds, to receive a list of alternative programs for the child, which is rank ordered according to the degree of similarity between the child for whom placement is being sought

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and other children already admitted to each of the listed programs. The list of alternatives can then be used by the practitioner to selectively apply for admission to those residential programs that are likely to accept the child into placement. Frequently, the list of prospective programs includes alternatives that a practitioner had not already considered.

The second software package, PROFILE, provides a comparative analysis of the children accepted into placement at each of the facilities included in the study. PROFILE can be used to identify which facilities accept children with specific characteristics such as low IQ, history of fire-setting, running away or drug abuse.

PROFILE has provided valuable feedback to facility administrators who participate in the project, enabling them to compare the population of youth they serve with youth served in other residential programs. In a number of cases, this information has been used in budget documentation to detail the unique features of a program's service population.

MATCH is currently in its third revision and PROFILE is being revised for the second time. Suggestions for revisions and features have come both from practitioners directly and from project staff responsible for training practitioners to use the software. In our experience, many practitioners avoid using the programs directly because of limited skills in touch-typing and lack of familiarity with using computers. These practitioners prefer to telephone the information about a child to project staff and receive back verbally a list of placement alternatives.

At the present time both software packages reside on a university mainframe computer and are accessible through the state with a terminal and dial-up modem. The software is in the process of being converted to both an IBM-PC version and to the mainframe computer at the state's child welfare agency to enhance access by child placement practitioners.

Application of this technology to other client groups and other types of human services where selection among service alternatives is a critical decision in the service delivery process is viewed as potentially very useful.

DEVELOPMENT OF THE COMPUTER MODEL

The details of the pilot test for the Continuum of Care system,[2] the development and expansion of the statistical analysis,[3] and utilization of the system[4] have been presented elsewhere. It seems most appropriate here to focus on the details of the development of the computer model underlying the software package MATCH. The software package, PROFILE, performs like a database report manager and does not incorporate statistical modeling.

A model is a representation of the relevant features of a real decision situation.[5] No model can be a precise replica of the real situation because it cannot contain all the information available. A model is useful if the information it contains is more important to the decision situation than the information that it omits.

The Continuum of Care child placement model fits into the category of computer models defined as digital simulations:

> A simulation model represents some real system or situation and imitates it in some fashion. Accordingly, it provides a way of experimenting that would be impossible in the real system itself. . . . A digital simulation involves numerical manipulation of mathematical relationships.[6]

The Continuum of Care model uses the statistical technique of discriminant analysis to relate the characteristics of children in placement to the programs and institutions to which they have been accepted. The simulated relationship between children and residential programs provides a basis for identifying placement alternatives for other children needing out-of-home care, based upon their similarity to the group of children already receiving services at each of the facilities included in the model.

Each institution is profiled in terms of the characteristics of their service populations, providing a common basis for analyzing the relationships among programs. This aspect of the model affords an opportunity to examine shifts in the distribution of children among facilities in response to changes in the service delivery system such as the addition or loss of program alternatives. Thus, the child placement model can be used to analyze policy questions regarding the system of service alternatives, as well as identifying placement resources for individual children.

THREE PHASES OF MODELING

The development of the Continuum of Care model consisted of three major phases:

1. problem definition and analysis of the statistical relationship;
2. validation of the model and assessment of its credibility; and
3. implementation of the model in a usable form.

These phases represent the focal point for activities at successive stages in the history of a modeling project like the Continuum of Care study. They are not discrete units which mark the start and stop of a unique set of activities since issues in later phases may force a return to some activity thought to have been completed in a prior phase.

The first phase of model building is essentially a research project. The problem must be defined and refined, and formulated as a research hypothesis that proposes the existence of a relationship upon which the model is to be based. Data resources must be targeted and a statistical technique identified that is capable of testing the research hypothesis on the basis of the data collected. If the statistical analysis supports the hypothesized relationship, the project can proceed to the next phase. If the research hypothesis cannot be supported, the modeling effort based on this relationship is stymied. The statistical analysis may, however, suggest and support other relationships as adequate alternatives for proceeding with the modeling effort.

The second phase of the modeling process assumes that the relationship between predictor and criterion variables is statistically significant. The focus of this phase is to determine if the verified relationship can support a simulation model. This determination is based on validating the predictive accuracy of the model and evaluating the utility of its predictions. Especially important is confirmation by expert decision makers that the product or predictions of the model are reasonable and do not conflict with conventional practice. The model should do as well as the experts, based upon the information it contains. Differences between the opinions of experts and the predictions of the model should be understandable, generally in terms of information not contained in the predictor variables.

Assuming that the research relationship is satisfactorily validated, the third phase is devoted to converting the research relationship into a product or a format on a media accessible to practitioners. For the Continuum of Care model, this involved the development of computer software for entering data and receiving recommendations, though other formats and media might be preferable for other decision situations. The results produced by the model must be converted to a format where they can be easily interpreted by prospective users. Ease of interpretation does not imply making decisions for the practitioner, but rather that the results be presented in a manner that assists the practitioner with the decisions he or she must make.

DEFINITION AND ANALYSIS OF THE MODELING RELATIONSHIP

In the child care literature, an ideal system of care is typified by the concepts of "spectrum" and "continuum."[7] A spectrum of care implies that there are sufficient service alternatives to meet the needs of any child. A continuum of care implies that the spectrum is organized along key dimensions like intensity of treatment or degree of confinement. The existence of a spectrum and a continuum implies that there is an "optimal" placement among the service alternatives that is most suitable to the needs of every individual child. The ideal that there is an optimal alternative for each child needing placement is contradicted by a consensus among child placement experts that there are many "difficult-to-place" children for whom placement resources are limited or unavailable. The problem is not one of selecting the best among alternatives; the problem is locating alternatives to select from.

Lack of resources indicates a deficit in the spectrum of services. The lack of a complete spectrum of care would preclude any claim that the continuum or ranked set of alternatives was optimal, i.e., one of the missing services might be preferable to those that are available in the spectrum. An incomplete spectrum does not, however, invalidate the notion of a continuum of care if the existence of a continuum is defined as ranking the alternatives that are available. The resulting continuum may be very useful in solving problems and supporting decisions; it does not, however, necessarily produce the single best answer for every problem, since that alternative may be missing from the spectrum of resources.

The modeling problem becomes one of identifying a continuum or rank ordering the alternatives for any child from the available resources that could meet the criterion of providing a satisfactory, though not optimal, set of placement alternatives. The operational task is defined as matching children and placements or, stated conversely, distinguishing among children already admitted to different residential programs.

From a review of the research on child placement and discussion with placement experts, historical solutions emerged that were based on efforts to derive typologies of children, institutions, or both. Typological solutions often result in resource directories, which attempt to catalog institutions based on specific services available within an institution or is based on characteristics of children that have been identified as a preferred client group. Resource directories identify the spectrum of available placement alternatives; discovering the continuum among services is a task left to the child placement worker.

Research efforts have attempted to differentiate children in various types of care. While some differences are found among children in different care settings, the similarities among children across types of care outweigh the differences. Moreover, the differences that are found do not suggest any method for rank ordering alternatives along any useful dimension as is required by the modeling problem.

The most promising research effort to provide the groundwork for a child placement computer model was developed by Jaffee.[8] Jaffee had panels of experts rate children's characteristics both for their importance in placement decisions and as indicators of the type of care needed. The computer was employed to efficiently solve the equations of weighted variables. Comparing actual placements, however, with those that would have been made based on the experts' model yielded sufficient disparity to conclude that the particular model was ineffective.

The guidance derived from these previous research efforts indicated that development of typologies and normative models based on expert opinions of what the system ought to look like were unlikely to be productive. In terms of the modeling problem of matching children and institutions, eliminating typologies directed the study away from any attempt to group institutions by type of care. Instead, each institution would be treated as a unique service, and the model would attempt to match children to specific institutions.

Based on Jaffee's conclusions, this study would attempt to identify institutions in terms of the characteristics of children they actually served, instead of the characteristics of children a group of experts thought they should be serving. This decision does not really contradict Jaffee's idea of using expert opinion about who belonged in a facility; instead it changes the identity of the experts from professionals outside the institution to professionals within the institution. The persons making admission decisions for any given facility would be regarded as the expert for that particular institution.

The decision to build a model based on children already admitted to a facility implies that children in the institution are appropriately placed. This implication is untenable to some professionals, especially those who see most institutional placements as unwarranted. There is no satisfactory response to these professionals other than the assertion that the modeling effort may lead to a better understanding of this system of care, both its strengths and its limitations.

The problem definition as developed thus far leads us to a research agenda to examine and compare the characteristics of children served in different institutions to determine if statistically significant differences exist among the profiles of client characteristics at different facilities.

The research hypothesis was: The group centroids or set of means of client characteristics are different among the institutions compared. The next step in this phase of the modeling process is to evaluate the hypothesis in terms of the availability of data and an appropriate statistical method.

The ability to test the research hypothesis depended on the availability of a reasonably consistent set of data across the institutions to be compared. In this respect, the research was assisted by state child care licensing standards, which set standards for all intake studies for residential placement. These standards did not assure that the data included in the intake studies of different institutions was of equal quality; it did offer a plausible source of data with which to work.

Evaluating the quality of the intake studies required a pretest of the research methodology. If the research hypothesis was supported, we could assume that there was sufficient consistency in the quality of the data to pursue a modeling effort. If the research hypothesis could not be supported, it could be due to a lack of consistency in the data set as well as the possibility that the hypothesized relationship was weak or nonexistent.

The available data set consisted of children known to be in placement, i.e., admitted to various institutions. The modeling problem would correctly be rephrased as: the replication of known decisions to admit a child into an institution based on information in the intake study. The complete admission process could not be studied, including decisions not to admit certain children, because institutions did not have uniform policies about retaining records for children not admitted. The data for decisions not to accept a child into placement could not be assumed to be comparable among facilities.

Since there was no way to know which intake data items were important to the admission process, a 139-item data-collection instrument was developed to collect every data item thought to be contained in intake studies. Intake studies would be read as literally as possible for each variable so that only items actually discussed in the written records would be marked as applicable.

A research hypothesis and a data resource were identified; it remained the identification of a statistical technique for testing the hypothesis.

Discriminant analysis is a statistical technique to determine if known groups of subjects can be distinguished based on a set of variables characterizing the subjects. If statistically significant differences exist among groups, discriminant analysis provides functions or equations for classifying subjects into groups. Classification can be done both for subjects included in the initial analysis and others for whom comparable data is available. Comparing classifications made by discriminant analysis with known placements is essential to the validation of the model. The classification feature of discriminant analysis provides the basis for building models based on this statistical technique.

If a large number of variables are available, the most powerful subset of discriminators can be extracted through a stepwise selection procedure that adds variables to the subset based on their contribution to discrimination among groups. The "best" subset may not be optimal since not all possible combinations of variables are considered. There are two basic selection methods: forward stepping adds a new variable at each step to a growing subset, while backward stepping eliminates a variable at each step from a shrinking subset. While backward stepping is often regarded as providing a more efficient subset of discriminators, no differences were found in the inclusion order of variables in the computer runs comparing stepping procedures for this study.

The number of variables included in a subset is up to the discretion of the researcher, although statistical aids are available for evaluating the contribution of each additional variable. If too many variables are included, false discrimination results with the model appearing to have more discriminating power because it takes advantage of idiosyncrasies in the data set on which the analysis was conducted.

The Continuum of Care model uses thirty variables (twenty in the pretest) selected through forward stepping procedures as computed by SPSS.[9] The number thirty was derived from a comparison of the accuracy rates of models that included various numbers of variables. After thirty variables, the accuracy rate did not substantially increase in spite of the inclusion of more variables. Including more variables would produce a computationally more complex model with no gain in accuracy.

The use of discriminant analysis affected the way variables were defined for subjects. Discriminant analysis excludes a case from the analysis if any variable contains a missing value. This could have the practical consequence of reducing the data set to very few subjects. Variables were, therefore, identified as "known to apply" and "not known to apply" (which would include what might be treated as missing data in other circumstances). Since we were attempting to model admission decisions based upon intake information, the decision to label data items as known or not known appeared reasonable.

Having derived a research hypothesis, an available database, and a statistical technique for evaluating the hypothesis, a pretest of the research methodology was conducted on 267 children in seven different residential programs. The discriminant analysis on this data set provided statistical evidence that statistically significant differences did exist between the client populations served in each of the seven institutions, both in terms of the cumulative proportion of variance accounted for by the six discriminant functions and the F-matrix of Mahalanobis distance scores.

The relationship between client characteristics and institutional placements stated in the research hypothesis was supported. The question of whether or not the relationship was sufficient to support a simulation model was examined next.

VALIDATION STRATEGIES

Research findings do not necessarily provide a basis for a simulation model that is to be used as a decision-making or problem-solving tool. Powerful analytic techniques are capable of detecting minute differences in data sets which are statistically significant but of little practical import. One of the most common examples of this phenomenon is a very low correlation coefficient, which tests to be significantly different from zero due to a very large sample size. The validation phase of modeling attempts to determine if the statistical relationship between the predictor and criterion variables provides for a useful product or is only an interesting statistical artifact.

The validation phase focuses on two issues: first, estimating the predictive accuracy of a model built on the statistical relationships, and second, evaluating the credibility of a model's results to expert practitioners. For both issues, the validation strategies are based on comparing model results to decisions made by acknowledged experts.

The discriminant analysis was conducted on cases for whom the actual placement was known and assumed to be the result of an expert decision. The first validation test is based on a comparison of actual placements to the predicted classification generated by the classification output from SPSS's discriminant analysis. This comparison is referred to as the "hit rate" and is calculated as the ratio of the number of predicted classifications matching known classifications divided by the total number of possible classifications. The predicted classifications were calculated using the individual group variance-covariance option instead of the pooled-covariance option, the recommended procedure when the assumption of homogeneity of variance among individual groups does not hold, as indicated by Box's M test reported by SPSS. Using this option is computationally more cumbersome, but does yield more accurate classifications as verified by comparative computer runs of the discriminant analysis using each of the variance-covariance options.

The hit rate for the seven-group pretest as calculated by SPSS was 83%. Further exploration of the literature on discriminant analysis classification rates indicated that the accuracy rates calculated by SPSS are an overly optimistic estimate since the cases classified are the same cases used in the development of the discriminant analysis functions.[10] More realistic hit rates can be determined by holdout methods where half the sample is used to develop the discriminant analysis functions and the remaining cases are classified as the basis for estimating accuracy. However, with sample sizes of about 50 per group, halving each group left very small samples for using discriminant analysis. An alternative method to dividing samples in two was developed by Lachenbruch[11] as a one-at-a-time holdout method for estimating the accuracy of classifications based on discriminant analysis. The Lachenbruch holdout method prescribes that each case be classified based on discriminant analysis functions based on all the other cases in the study. According to Lachenbruch, this strategy produces an almost unbiased estimate of classification accuracy.

The procedure as described by Lachenbruch was not available in SPSS or any other available statistical package where discriminant classifications were calculated using individual variance-covariance matrices. The Lachenbruch holdout technique was developed as a FORTRAN program[12] for use in this study. Using the Lachenbruch holdout, the accuracy rate for the pretest study was determined to be

69%. This hit rate compares favorably with other discriminant models of this size reported in the literature and was judged sufficiently high to warrant a full-scale study.

The data collection instrument was revised to reflect the availability and accuracy of certain data items in intake studies. Using the revised instrument, the data collection process was begun for a full-scale study. Over a seven-year period of time the study database has grown to include samples of children from 72 programs admitted to foster family care, group home care, basic child care, residential treatment, correctional facilities, and state psychiatric hospital programs for children and adolescents. The 72 programs in the model represent an unduplicated count since some programs have been sampled two or more times due to changes in admission policies, licensing category, and changes in key administrative staff.

The accuracy rate for a 72-group discriminant analysis is, as would be expected, much lower than that of a seven-group analysis. Moreover, no precedents in the research literature could be found that describe accuracy rates for this size application. Since the placement system contains more than one acceptable placement alternative for most children (e.g., a child could be an acceptable candidate for several residential treatment centers), it appears excessively conservative to limit a hit to only a match between the known placement and the first ranked alternative. Adhering to this criteria produces a hit rate of 31%. If a hit is considered to be a match between the known placement and a number of top alternatives, the hit rate rises rapidly. If any of the top six classifications were regarded as a hit, the accuracy rate approximates the 69% found for the pretest study.

While the hit rate provided a numerical basis for assessing the value of the modeling technique, the issue of credibility with child placement workers required a different strategy. This issue was especially difficult since the child placement model was under development for several years before it contained sufficient alternatives to represent a reasonable set of alternatives for any given child.

The results of the pretest, however, created an opportunity to compare results of the developing model with placement decisions made by a group of child placement experts. The pretest research helped solidify concern for children who were regarded as difficult to place because of a lack of resources. Difficult-to-place children were identified in the discriminant classification as having a very low probability of being admitted to any program included in the model.

In response, a multiagency placement committee was established to review the case records of difficult-to-place children and then use their combined energies to secure placements for these children. Since we could enter the characteristics of these children into a discriminant model, the committee provided a basis for comparing those classifications (which came to be regarded as recommendations) made by discriminant analysis with those recommendations made by the committee of experts. Since the developing discriminant models did not include all of the alternatives available to the team of experts, it was impossible to achieve equality with the expert recommendations. It did, however, provide a forum for analyzing whether or not the discriminant model was making classifications that were appropriate or inappropriate for a given child. Although, unfortunately, no formal statistical count of comparisons was retained, the model fared well in comparison to the views of these experts and confidence in the modeling effort was enhanced.

IMPLEMENTATION

During the pretest study, all computational work was done using SPSS's version of discriminant analysis, except for the Lachenbruch holdout routine which was not available in SPSS. The Lachenbruch holdout was programmed in FORTRAN and drew heavily upon computational subroutines available in the IMSL library. While SPSS could be used to classify cases and make recommendations based on discriminant analysis, the desire for greater control of the format of the input and output from the model led to the development of other FORTRAN programs incorporating discriminant analysis classification.

During the development of the MATCH program, a mathematical problem emerged that distracted model development until it could be resolved satisfactorily. If a database contains a number of dichotomous variables, the problem of singularity (linearly dependent vectors) of the variance-covariance matrix occurs when more than one characteristic has the same value for all members of a group, e.g., a boy's ranch for adjudicated delinquent children. The variables cannot be omitted from the study since this could result in a large number of inappropriate recommendations. The problem of singularity in a matrix means that the matrix cannot be inverted—a step necessary to computing classification scores.

The singularity problem is solved by reducing the rank of the variance-covariance matrices until each is a non-singular submatrix. There are two options for doing this: reduce the ranks of all the matrices equally, or reduce the rank of each matrix until it is no longer singular. No known literature suggests which option to the problem is preferable. SPSS reduces the rank of each individual matrix until it is non-singular. Experimentation with this method led to the conclusion that this changes the value of a constant required in the classification formula. The rank of the matrix can become the critical factor in calculating classification scores. This is not desirable because characteristics of the data rather than the data values themselves are operative in classifying cases. The programs used in the Continuum of Care system reduce the ranks of all variance-covariance matrices equally. The problem of singularity represents the type of unexpected problem that can be encountered in modeling, which is critical to producing an operational model.

Once the problem of singularity was resolved, the crucial issues of implementation focused on producing a form of the discriminant classification procedure that was usable by child placement practitioners. The general design of the computer program called for interactive data entry of a child's characteristics at a computer terminal, solution of the mathematical model, and display of the model-generated list of alternatives or recommendations on the terminal screen.

The configuration of the output display was most easily settled. A user would receive a rank ordered list of 10 placement recommendations for the child—ranked in decreasing order of the child's probability of being admitted to each of the listed institutions. The decision to display ten placement alternatives was an arbitrary selection, but was considered a reasonable number of alternatives for a user to select from. Since there are factors in the placement process that are not known to the model, such as whether or not a recommended facility has an opening, the list of placement alternatives had to be sufficiently long to ensure that one or more of the recommended alternatives would have an opening. A sample output screen in shown in Figure 1.

The development of the data entry part of the MATCH program was redone several times before an acceptable user interface was achieved. The first version required the user to type short alphabetic codes to describe the characteristics of the child. This was difficult for workers who lacked typing skills. Data entry was initially so cumbersome for these workers that usage of the model was minimal.

The second version of the MATCH program minimized the amount of typing by allowing for easy movement of the "cursor" through a checklist of descriptors displayed on the terminal screen. If a descriptor applied to a child, a worker typed an "X" beside the descriptor and hit the "RETURN" key. Descriptors that did not apply to a child could be skipped by simply hitting the "RETURN" key, which moved the cursor to the next descriptor. Some items required a numeric entry or a date, but the number of keystrokes required by a user was kept to a minimum.

The third version of the MATCH was necessitated by telecommunication problems. Since the cursor was now moving between the descriptors listed on the terminal screen, "noisy" phone lines linking a terminal to the mainframe computer disrupted the align-

Figure 1.

CONTINUUM OF CARE PLACEMENT MATCHING REPORT: 18 MAR 84

MODEL 1: ALL VARIABLES FROM ADMISSION RECORDS/ALL CASES IN ALL BENEFIT GROUPS

INSTITUTION OR PROGRAM RECOMMENDED FOR THIS CHILD	SIMILARITY TO THIS GROUP ONLY	FORCED RANKING AMONG ALL GROUPS
CENTRAL STATE TREATMENT CENTER	.9995	.4060
CENTER FOR GIRLS	.9835	.3312
CHURCH CHILDRENS CENTER	.8418	.1178
TEEN TREATMENT CENTER	.8086	.0606
SOUTHWEST CHILDRENS HOME	.1204	.0250
EASTERN CHILDRENS HOME	.5910	.0140
NORTHWEST CHILDRENS HOME	.3696	.0138
CITY CHILDRENS HOME	.7724	.0118
CHURCH CHILDRENS HOME	.1497	.0050
FOUNDATION TREATMENT CENTER	.0933	.0038

CODES: C=CHANGE ITEM N=NEXT SCREEN P=PRIOR SCREEN Q=QUIT R=REDO LINES ment of the screens. The capacity to reprint all or part of a screen was added with a one letter entry code "R" for redo lines. In addition, other coded entries were added: "C" to change an item, "N" to go to the next screen, "P" to go to the previous screen, and "Q" to quit the program. These codes enabled the user to move freely around and between the entry screens to review and change data entries. This is the current version of MATCH, which has been pilot-tested at various sites across Texas. A sample of a data entry screen is shown in Figure 2.

Ongoing feedback from system users has resulted in a number of findings and recommendations which will be incorporated in the next version of MATCH. For example, it was found that the list of placement alternatives generated by the model, on occasion, included an unreasonable alternative, such as a recommendation to place a girl at a boys' ranch. This is not difficult to explain since classification scores are the sum of weighted variables and, at some point, the weight for gender can be offset by the weighted scores for other characteristics. If does, however, generate suspicion among users about the credibility of the model and its recommendations. The next version of MATCH will be programmed to eliminate recommendations of this sort.

Figure 2.

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SEX:               | ETHNICITY:             | DATE OF:
  (1) --MALE       | (3) --MINORITY         | (5) BIRTH:   12 MAR 69
  (2) X-FEMALE     | (4) X-NON-MINORITY     | (6) FIRST PLACEMENT:  15 MAR 69
-------------------------------------------------------------------------------
CONSERVATOR:            | LEGAL STATUS:                 | PARENTS MARITAL STATUS:
  (7) --FAMILY MEMBER   | (11) --DEPENDENT/NEGLECTED    |  (15) --NEVER MARRIED
  (8) X-CHILD WELFARE   | (12) --CHINS                  |  (16) --INTACT MARRIAGE
  (9) --TYC             | (13) --DELINQUENT             |  (17) X-MARITAL BRKDOWN
 (10) --JUVENILE DEPT   | (14) --COMMITTED [NON-TYC]    |
-------------------------------------------------------------------------------
FAMILY DESCRIPTORS:                  (25) --FAMILY IS POOR
 (18) X-PARENTAL RIGHTS TERMINATED   (26) --PARENTAL CRIMINAL ACTIVITY
 (19) --UNSTABLE RELATIONSHIPS       (27) --PARENT ON PAROLE/IN PRISON
 (20) --FATHER MENTALLY ILL OR MR    (28) --FAMILY CONFLICT/VIOLENCE/SEX ABUSE
 (21) --MOTHER MENTALLY ILL OR MR    (29) 1--NUMBER OF OLDER SIBLINGS
 (22) X-FATHER PHYSICALLY ILL        (30) 2--NUMBER OF YOUNGER SIBLINGS
 (23) --MOTHER PHYSICALLY ILL        (31) ---NUMBER OF SIBS PLACED OUT OF HOME
 (24) --PARENT SUBSTANCE ABUSER      (32) ---NBR SIBS TO PLACE WITH THIS CHILD
===============================================================================
DIRECTIONS:  THIS SCREEN IN NOW COMPLETE.  IF YOU WISH TO MAKE ANY CHANGES,
==========   ENTER C AND RETURN.  IF THE SCREEN IS CORRECT, HIT RETURN.
===============================================================================
CODES: C=CHANGE ITEM   N=NEXT SCREEN   P=PRIOR SCREEN   Q=QUIT   R=REDO LINES
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Additional data quality checks will be added to the computer program to solicit verification from the user when unusual combinations of data items are entered. For example, if a worker enters case information on a teenager, but does not enter the child's grade in school, the computer reads the blank for school grade as a zero, which is equivalent to the code for pre-school and the child will receive recommendations appropriate for a teenager who has never been in school. While this may accurately represent the child, the next version of MATCH will require the user to verify any data that is logically inconsistent or outside of expected ranges.

The computer program itself was designed for ease of use. All data entry instructions needed by the user are displayed on the terminal screen and updated as needed. However, still to be added to the program is an on-line set of detailed instructions and definitions to assist the user in responding to specific data items. The only instructional resource at the present time is a written manual that provides a detailed description of each data item. The next revision of the program will include an on-line "Help" facility which will enable a user to interactively request information from the manual for any data item.

As the model and program continue to evolve, it is anticipated that users will suggest more modifications and improvements.

NOTES

1. The Continuum of Care Project has been funded by the Texas Department of Human Services through state grant funds from the National Center for Child Abuse and Neglect under P.L. 93-247.
2. A. James Schwab, Jr., Michael E. Bruce, and Ruth G. McRoy, "Matching Children with Placements," *Children and Youth Services Review*, 6 (Spring 1984), pp. 125-133.
3. A. James Schwab, Jr., Michael E. Bruce, and Ruth G. McRoy, "A Statistical Model of Child Placement Decisions," *Social Work Research and Abstracts*, 21 (Summer 1985), pp. 28-34.
4. A. James Schwab, Jr., Michael E. Bruce, and Ruth G. McRoy, "Utilizing Computer Technology in Child Placement Decisions," *Social Casework*, 67 (June 1986), pp. 359-368.
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6. McKenna, pp. 330-331.

7. M. F. Mayer, L. H. Richman, and E. A. Balcerzak, *Group Care of Children: Crossroads and Transitions*. New York: Child Welfare League of America, 1977.

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11. P. A. Lachenbruch, "An Almost Unbiased Method of Obtaining Confidence Intervals for the Probability of Misclassification in Discriminant Analysis," *Biometrika*, 23 (1967), pp. 639-645.

12. The computer program was written in the FORTRAN programming language, using a statistical subroutine library developed by International Mathematical and Statistical Libraries, *IMSL Library: Reference Manual*, Houston, Texas: IMSL, Inc., 1979.