

# Federal Probation

Probation Officers' Role Perceptions and Attitudes  
Toward Firearms ..... *Richard D. Sluder*  
*Robert A. Shearer*  
*Dennis W. Potts*

Family Violence: Challenging Cases for  
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Role Negotiation: Sorting Out the Nuts  
and Bolts of Day-to-Day Staff  
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Polysubstance Abuse: The Interaction of  
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Single-Cell Occupancy in America's  
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SEPTEMBER 1991

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# Federal Probation

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## This Issue in Brief

**Probation Officers' Role Perceptions and Attitudes Toward Firearms.**—The issue of whether probation officers should carry firearms has tremendous implications for the future of probation. Despite the importance of the issue, however, there has been little empirical investigation to determine whether probation officers' opinions about firearms are related to their role perceptions, individual characteristics, or other work-related factors. Using data collected from a population of probation officers attending a state-wide probation training academy, authors Richard D. Sluder, Robert A. Shearer, and Dennis W. Potts explore relationships between those variables and officers' opinions as to whether they should be permitted or required to carry firearms in the performance of their duties. The authors discuss findings from the study, as well as implications for the delivery of probation services.

**Family Violence: Challenging Cases for Probation Officers.**—Author Meredith Hofford presents data on the frequency and seriousness of domestic violence and offers suggestions and guidance as to how the courts and probation officials can improve their supervision of the perpetrators of domestic violence. The article presents the proposition that domestic violence is much more widespread—and its consequences much more serious—than has been generally accepted. The author points out that with adequate and effective probationary supervision, the recurrence of domestic violence, the frequency of violent crime stemming from domestic violence, and the intergenerational effects of spousal abuse on children can all be significantly decreased.

**Role Negotiation: Sorting Out the Nuts and Bolts of Day-to-Day Staff Supervision.**—As organizations become larger and more complex, the need for cooperation and coordination between managers and staff increases significantly. Authors Jud Watkins and Robert A. Luke, Jr., describe a structured way for people who work together to sort out their day-to-day needs and arrive at an interpersonal contract, or agreement, that promotes the mutual efficiency and job satisfaction of both negotiators. The authors detail

the procedure of role negotiation, cite examples of its application in the probation and pretrial services setting, and suggest alternative uses such as group nego-

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Featured in "LOOKING AT THE LAW" . . .

- Armed Career Criminal Act
- Sentences for carrying a firearm during violent offenses and drug offenses

# ASSYST—The Design and Implementation of Computer-Assisted Sentencing

BY ERIC SIMON, GERRY GAES, AND WILLIAM RHODES\*

## Overview

**A**SSYST (Applied Sentencing System) assists Federal judges, prosecutors, defense attorneys, and probation officers when computing sentences under the Sentencing Guidelines promulgated by the United States Sentencing Commission.<sup>1</sup> Furthermore, ASSYST allows users to record and recall guideline calculation and to investigate "what if" scenarios when applying the guidelines.

Although ASSYST was not developed using the formalism employed by most expert system designers, it meets several criteria of a formal expert system;<sup>2</sup> in that sense, ASSYST is an expert system for legal analysis.<sup>3</sup> It is a "domain specific knowledge representation" of the rules for determinate sentencing in the Federal judicial system. By this we mean that the logic used by ASSYST was determined by an expert body, namely, the Commissioners of the U.S. Sentencing Commission.

For the most part, ASSYST is "deterministic." That is, it elicits from the user all the information required to compute a final determinate sentence. However, unlike expert systems that resolve decision conflicts, ASSYST only suggests possible solutions when the guidelines are ambiguous or require discretion.

ASSYST has been a success. In June 1988, the Commission provided every U.S. probation office with a copy of the software; updated versions have been furnished periodically. In September 1989, the Executive Office for U.S. Attorneys provided every U.S. attorney's office with the most recent version, and the Administrative Office of the U.S. Courts provided the Federal defense bar with copies. Members of the private bar and the judiciary have been sent copies upon request. The response has been favorable. Officers have reported substantial decreases in amount of time

spent to prepare presentence investigation reports. The software has proliferated throughout the Federal criminal justice system. As a publication of the Federal Government, ASSYST is a public domain program.

## Characteristics of the U.S. Sentencing Guidelines

### Background

The Sentencing Reform Act of 1984 established a Federal sentencing commission and empowered its commissioners to promulgate mandatory sentencing guidelines for Federal court judges. The guidelines are comprehensive, covering almost all Federal felonies and most serious Federal misdemeanors. Compared to extant state sentencing guidelines, the Federal guidelines are complex. Rather than a simple sentencing grid, which is typical of most state systems, the Federal guidelines require a grid with 43 x 6 cells (offense severity by criminal record) and a lengthy, complex set of instructions to determine the cell that is relevant for the defendant. Within a guideline cell, the judge is given discretion to set a prison term within a 25-percent range (or 6 months, whichever is larger). The judge may depart from this range for narrowly circumscribed reasons, and any departure may be appealed by the prosecution or defense.

Although the scope of Federal Sentencing Guidelines is unprecedented, many of the procedures for sentencing are consistent with past practices. The probation officer still must investigate the case and prepare the presentence report (PSR). However, guidelines are now part of that procedure, and PSRs must reflect the information and considerations required by the guidelines. Because sentencing is now rule driven, a new premium has been placed on accurate and detailed information and on explicit reasoning to convert this information into a sentence. Inarguably, the job of the probation officer has become more complex and time consuming. This complexity was one of the driving forces behind the development of ASSYST.

### How the Guidelines Work

The sentence range comes from a grid that is defined by 43 offense levels and 6 criminal history categories. The probation officer's task is to determine the appro-

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\*Mr. Simon is a senior research analyst at the Federal Bureau of Prisons. Dr. Gaes is director of research at the Federal Bureau of Prisons. Dr. Rhodes is senior scientist at Abt Associates. Nothing contained herein necessarily reflects the views of the Federal Bureau of Prisons, Abt Associates, Inc., or the U.S. Sentencing Commission. ASSYST was conceived and developed while William Rhodes was research director and Eric Simon was associate research director for the U.S. Sentencing Commission, and Gerry Gaes was detailed to the Commission for a 2-year period. Eric Simon was project director and senior programmer for ASSYST; Gerry Gaes was the second senior programmer.

priate offense level for the crime and the proper criminal history category for the defendant. In the following section, we will work through a guideline application for a hypothetical case to give the reader some flavor for the logical and computational details of the guidelines.

To name just a few of the considerations required by the guidelines, there are rules associated with specific offense characteristics,<sup>4</sup> general aggravating and mitigating circumstances,<sup>5</sup> criminal history,<sup>6</sup> calculating scores for multiple counts, offense groupings, and guideline departures. The multiple counts rules and the grouping rules are especially complicated (as we illustrate later). The former—multiple counts—provide rules by which several counts for a given offense type (such as three counts of embezzlement) should be combined for guideline purposes. The latter—grouping rules—stipulate how different types of conviction counts (such as a robbery and a drug-law violation) should be combined to yield one sentence.

ASSYST suggests to the user appropriate factors to consider, prompts the user for the correct response, does the necessary calculations without error, and stores and recalls responses. ASSYST incorporates all of the tables required to calculate guideline scores and facilitates use of these tables. Some of these tables are straightforward, such as the table used to determine the offense level based on the dollar loss from a fraud. For such tables, ASSYST performs a lookup function. Other tables are more complicated, and some, such as the drug equivalency tables, require complicated conversions to yield commensurate measures for disparate items. For example, ASSYST will convert measurements (e.g., ounces to grams) and convert drug equivalencies (e.g., 1 gram of phenobarbital equals 0.125 grams of marijuana) so that counts involving different drugs can be aggregated without effort.

#### *Guideline Worksheets*

The guidelines can be difficult to apply. So, just like the IRS prints tax forms to help taxpayers compute their taxes, the Sentencing Commission has provided a "worksheet" to help probation officers compute guideline sentences. Unlike an IRS tax form, the worksheet is not an official document. Instead, the Commission developed these worksheets to assist probation officers in applying the logic required for correct guidelines applications. The worksheets were carefully developed and pretested; consequently, the worksheets provided the core logic for developing the expert system.

The logical structure of ASSYST is based on a worksheet. Indeed, using ASSYST is equivalent to completing a worksheet, and throughout this report, we use

the terms "working with ASSYST" and "completing a worksheet" interchangeably. The end product of ASSYST is a completed worksheet that can be used by the probation officer to communicate his calculations to the judge and can be sent to the Commission for monitoring purposes.

#### *The Program*

In this section, we simulate a hypothetical application of the ASSYST software, but we make no attempt to enumerate its many features. Running the program is the best way to appreciate its capabilities. All the boxes in this article are taken from actual ASSYST screens.<sup>7</sup>

The opening menu to ASSYST appears in figure 1. This is called the "main menu" and is the program's primary decision branch. Typing the up and down arrow keys on the keyboard changes the menu choice and prompts different messages at the bottom of the screen. These messages are designed to remind the user of the purpose of the highlighted menu choice.

ASSYST consists mostly of menu choices such as those below. ASSYST will take the user through menu choices that are relevant to the offense and offender with whom the user is dealing. The user selects a choice by (1) moving the highlight to the desired choice and (2) typing the return key to select that choice. In general, a worksheet can be completed by sequential selection of choices d through i.

Looking at the opening menu, the first choice allows the user to initiate a worksheet. The second choice—"Recall an old worksheet (docket number required)"—allows the user to recall a worksheet that had been previously prepared and saved.

To begin a new worksheet the user chooses main menu selection "a." If the user later intends to save or recall a worksheet, he is required to enter a docket number. This identification information allows ASSYST to store and retrieve information, which can be recalled and modified when necessary. The docket number is crucial because the computer recalls worksheets based on the docket number. Other identification information can be used to search the data base when the docket number is unknown.

ASSYST will save multiple versions of the same worksheet, each of which will have the same docket number. In such instances ASSYST will ask for a unique "description" that can be used to distinguish between multiple versions.

#### *Recalling a Worksheet—Worksheet Modifications*

To recall a worksheet, the user selects choice "b" from the main menu. When asked for a docket number, he or she can take one of two approaches. If the user knows the docket number, that number is entered, and

MAIN MENU	
a	Enter a new worksheet (docket number required)
b	Recall an old worksheet (docket number required)
c	Change an offender's identification information
d	Enter or modify all counts of conviction
e	Apply adjustments from chapter 2 and 3
f	Apply "grouping" rules
g	Adjust for acceptance of responsibility
h	Adjust for criminal history
i	Compute the guideline sentence
j	Save information on current case
k	Print worksheets
l	Remove current record from database
m	Return to introductory screen

FIGURE 1. SCREEN DEPICTING MAIN MENU

the computer will search for it in its data file. If the computer finds more than one record with the specific docket number, it will report them all so that the user can choose among them.

If the user is unsure of the docket number, he or she can ask the computer for help when the computer asks for the docket. The computer will respond by asking the user to specify "search criteria." It will, for example, list all worksheets that have the user's initials, or the judge's initials, or all worksheets completed within any two dates. It will perform a more complex search, for example, finding all worksheets that have both the user's initials and the judge's initials.

Once a worksheet has been recalled, one can go to any menu and make modifications by selecting the appropriate menu choice. Immediately upon making any changes, ASSYST will recompute all calculations in the worksheet.

For example, suppose a probation officer has a case where there are four bank robberies. In one of them, she enters \$12,000 as the amount that was stolen. Now suppose new information makes it necessary to change that entry to \$112,000. This change will affect the offense level for the robbery. This, in turn, will change the calculations involved in other parts of the worksheet. ASSYST will automatically make this dollar change and will cascade the effect of this change through the worksheet. This cascading feature of

ASSYST not only saves time and ensures accuracy, it also allows users to test the different implications of varying sentencing scenarios.

*Record Counts of Conviction*

ASSYST has many features which help the user enter and group counts of conviction. The user must enter the title and section for each count of conviction. The computer will indicate the applicable guideline section, provide a brief description of that section, ask the user to identify which counts involve the same victim, initiate groupings for the multiple-counts rule, and record all responses in preparation for completing the worksheet.

An example demonstrates how this is done. In this example, the offender has been convicted of trafficking in drugs, possession of a firearm (part of the drug offense), possession of cocaine, and receiving stolen property. This illustration assumes a multiple-count conviction. For single-count convictions, ASSYST operates in an accelerated mode, bypassing irrelevant questions.

After the user has selected main menu item "d" the screen looks like figure 2.

Enter title					
Title	App?	Section	Counts	Guideline	Offense Description
1		U.S.C. §			

FIGURE 2

As the user adds titles and sections denoting Federal statutes, ASSYST provides the appropriate guideline and offense descriptions. There are some title/section entries which refer to more than one guideline, and ASSYST lists all of the guidelines so that the user can choose the appropriate one.

After each row entry, ASSYST prompts the user to add, modify, or delete rows. In our example, we will use four statutes of conviction. After entering the four statutes, the user screen looks like figure 3.

*Conspiracy and Other Special Problems*

Conviction for conspiracy poses a special problem because guidelines are generally not written for spe-

Title	Section	Counts	Guideline	Offense Description
1 21 USC	§ 841(a)	2	2D1.1	DrugManufctry/ Trafficking
2 21 USC	§ 844(a)	1	2D2.1	Unlawful Possession
3 18 USC	§ 922(g)	1	2K2.1	Trans. Firearms/ Proh. Person
4 18 USC	§ 2313	1	2B1.2	Receipt of Stolen Property

FIGURE 3

You have entered a conspiracy, attempt, solicitation or an aiding and abetting guideline on row number 1.

Enter guidelines for the substantive offense behavior underlying the conspiracy (attempt, solicitation, aiding) counts PROVIDED THESE SUBSTANTIVE OFFENSES ARE NOT WHOLLY INCLUDED IN CONVICTION COUNTS THAT HAVE ALREADY BEEN LISTED. If §2X1.1, when an attempt, solicitation or conspiracy is expressly covered by another offense guideline, apply that guideline section. (See Commentary to §2X1.1).

DO YOU NEED TO ENTER AN ADDITIONAL SUBSTANTIVE OFFENSE OR OFFENSES NOW?

YES NO

F1 - guideline commentary  
 F2 - for rules 3D1.2(b)(1) & (2)  
 F3 - for illustrations  
 F9 - for help with the program

FIGURE 4

cific offense conspiracies and instead require application of the guideline for the substantive offense underlying the conspiracy. In such cases the computer will inquire about the underlying substantive offense.

ASSYST is particular when dealing with conspiracy and other special guidelines (e.g., attempts, aiding and abetting, etc.). The user must enter these crimes in the following manner: The conspiracy (or attempt) must be entered on the first row. Then, if one tries to exit this section of the program without entering any of the underlying offenses, the computer will show the screen displayed in figure 4.

The computer will respond similarly for aiding and abetting, accessory after the fact, and misprision of a felony. ASSYST will prompt with appropriate questions required for adjusting these guidelines. Simply answering "YES" to the prompt allows the user to add the underlying offenses.<sup>8</sup>

Another problem occurs when separate statutes of conviction reference the same guideline section, and section 3D1.2(d) seems to require counts to be aggregated. The general rule (followed by the computer) is to combine all counts with the same guideline into a

In order to calculate the adjusted offense level for each entry below, move the highlight bar to the entry you want to select and type "enter." You can also select an entry by typing the first letter in the entry row. If a checkmark appears next to the row, it means you have returned from the Chapter Two adjustments for that entry. To exit this panel, select the last row entitled "Exit to the Main Menu."

a Entry 1 2D1.1 21.841(a) Drug Manufacture/Trafficking  
 b Entry 2 2D2.1 21.844(a) Unlawful Possession  
 c Entry 3 2K2.1 18.922(g) Tran. Firearms/Proh. Persons  
 d Entry 4 2B1.2 18.2313 Receipt of Stolen Property  
 e Exit to the Main Menu

FIGURE 5

AMENDED  
 15 Jan 1988  
 15 Jun 1988  
 1 Nov 1989  
 1 Nov 1990

You Are Working On Entry: 4  
 Applicable Guideline: 2B1.2  
 Description: Receipt of stolen property  
 Base Offense Level: 4  
 Adjusted Offense Level: 4

Criminal Offense Menu (select in any order)

- a Return to the cluster list
- b Base offense level calculation
- c Specific offense characteristics
- d Victim related adjustments
- e Role in the offense
- f Obstruction of justice
- g Specific information about this guideline

FIGURE 6

single line on the computer screen. Thus, ASSYST will aggregate the like counts.

Infrequently, a situation may arise that requires the user to override the general rule of aggregating counts that have common guidelines under §3D1.2(d). In this instance and, in fact, throughout the program, the user can reject the computer's decision and substitute his own choice or calculation.

*Chapter Two and Three Adjustments*

To apply Chapter Two and Three adjustments, the user selects main menu option "e," which invokes the screen in figure 5. There are four entries. The user will select each, in any order, to initiate the application of Chapter Two and Three adjustments. To illustrate, suppose the user selected 2B1.2. The screen in figure 6 would appear.

For every guideline, the user is required to select the "base offense level calculation." If any of the other Chapter Two or Three adjustments are applicable, the user can apply them by selecting choices "c" through "f" of this menu.

Notice the "AMENDED" message at the upper right. The Commission has continuing authority to amend guidelines on an annual basis. In many cases, the nature and date of the amendment, as well as the date of the criminal conduct, may be extremely relevant to the guideline computation. Consequently, all Chapter

Criminal Offense Menu (select in any order)

- a Return to the cluster list
- ✓ b Base offense level calculation
- c Specific offense characteristics
- d Victim related adjustments
- e Role in the offense
- f Obstruction of justice
- g Specific information about this guideline

There are no base level choices to be made — please continue

FIGURE 7

Two guidelines that have been amended will show a message of this type.

Because there are no choices to be made regarding the base offense level for receipt of stolen property, ASSYST tells the user that "There are no base level choices to be made—please continue." Note the check-

You Are Working On Entry: 4

Applicable Guideline: 2B1.2

Description: Receipt of stolen property

Base Offense Level: 4

Adjusted Offense Level: 4

a Enter the estimated value of the property.

b Was a firearm, destructive device, or controlled substance taken?

c Did the property include undelivered U.S. mail?

d Was the offender in the business of selling stolen property?

e Did the offense involve more than minimal planning?

f Did the offense involve organized scheme?

Return to Criminal Offense Menu

FIGURE 8

mark before the Base Offense Level Calculation in figure 7. Throughout ASSYST, checkmarks indicate that the user has completed a step.

Next, the user can choose "Specific Offense Characteristics." A new screen appears as shown in figure 8. Selections "a" through "e" list the specific offense characteristics under the guideline for receiving stolen property. The user can select "a" through "e" in any order. ASSYST asks the relevant questions, stores the responses, and computes appropriate adjustments in the offense level.

*Getting Help*

ASSYST has many levels of help messages. For example, if the user wants to know more about §2B1.2, he or she could choose selection "g" from the "Criminal Offense Menu." Turning to the "Specific Offense Characteristics Menu," the user might be interested in a definition of "firearm." Context-sensitive help is available by moving the highlight bar to the firearm menu choice and pressing "F1." The computer responds by overlaying a screen of definitions. (See figure 9.)<sup>9</sup>

This definition consists of guideline commentary that helps the user decide how to evaluate question "b": "Was a firearm, destructive device or controlled substance taken?"

ASSYST can help in additional ways. For instance, if the user types F2 the help screen will provide the text of the guidelines without commentary. The user can use F2 for a reminder of the number of level adjustments (that is, severity levels of the guideline

HELP SCREEN—Press Esc to exit. Use the up- AMENDED  
and down-arrow to move the text one line at a  
time. Use PgUp and PgDn to move the text 12 lines.

RECEIVING STOLEN PROPERTY

FIREARM

"Firearm" means any weapon which is designed to or may readily be converted to expel any projectile by the action of an explosive. A weapon, commonly known as "BB" or pellet gun, that uses air or carbon dioxide pressure to expel a projectile is a dangerous weapon but not a firearm.

DESTRUCTIVE DEVICE --more--

FIGURE 9

sentencing grid) required for any specific offense characteristic. This help is purely for one's information because the program automatically makes the correct level adjustments.

By typing F3, ASSYST will provide examples of how the guidelines are applied. F4 accesses relevant court decisions pertaining to certain guidelines.

Notes created by the user can be stored with the worksheet by typing F5. Anything entered into this note field can be printed at a later time. The F7 key will allow the user to store and recall guideline definitions. The user would use this feature if, for example, he or she wanted the guideline definition of "seriously injured."

F8 provides general information, notably basic offender information (docket and name). It will also provide a "screen name." The screen name can be an aid when communicating to the Commission about specific questions or problems the user might be having; it is a precise way of locating "where you are" in the program. Finally, F8 will always tell the user what all the "F" keys do.

*Chapter Two Adjustments, Continued*

As the user works through Chapter Two and Three adjustments, ASSYST notes his or her choices by placing checkmarks adjacent to the menu selections. These checkmarks are stored along with all of the information on the defendant. Later, if the user retrieves this particular offender's information and returns to this part of the program, ASSYST will remind the user that he or she has already calculated or

Title	App?	Section	Counts	Guideline	Common Victim Number	Grp No.
1	21 U.S.C.	§ 841(a)	2	2D1.1		1
2	21 U.S.C.	§ 844(a)	1	2D2.1		2
3	18 U.S.C.	§ 922(g)	1	2K2.1		1
4	18 U.S.C.	§ 2313	1	2B1.2		3

FIGURE 10

considered some adjustments and not others. Using an adjustment does not prohibit one from reconsidering it; however, the checkmark reminds users they have at least considered this adjustment in the past.

*Grouping and Common Victim Adjustments*

One of the more difficult problems in guideline application is the interrelationship among the rules involving conviction counts, separate or common victims, and the grouping of related counts. ASSYST steps the user through these rules. ASSYST first asks the user if a "common victim or transaction" has occurred. Once common victims have been identified, ASSYST attempts to group counts according to the program's interpretation of the multiple-counts rule.

The computer assigns "count group numbers" to each of the counts. In this illustration (figure 10), the counts for weapons possession and distribution of drugs are grouped together. The counts for possession of cocaine and receiving stolen property are grouped separately. Referring to the guidelines, the user will find that the weapon and distribution counts are grouped under §3D 1.2(c) while the remaining counts cannot be grouped under the rules at §3D1.2. The computer, as can be seen, has provided the correct application of the multiple-count rules.

Of course, in some instances the logic built into ASSYST may yield an incorrect grouping. The offender may have been arrested for the drug distribution charge on one day and the weapons possession charge on another day, a fact situation that invalidates the program's logic. Because ASSYST's logic may yield an incorrect result, the user can modify the computer's initial assessment. ASSYST will always ask the user if he wants to regroup.

*Criminal History*

Main menu selection "h" applies the "Criminal History" section of the guidelines. ASSYST provides a great deal of guidance on filling out the different fields on this worksheet.

For example (in figure 11), when the user is asked to enter a "yes" or "no" for Under Criminal Justice Control (at the time of the instant offense), "the bottom

of the screen reads: "Includes probation, parole, supervised release, imprisonment, work release, and escape" to remind the user of relevant criminal justice statutes that might be counted. Also, at appropriate times, the computer will send a special message instructing the user to provide certain information under special conditions.

For example, if the instant offense is a revocation of probation or parole from a previous crime, ASSYST will ask the user to specify that previous crime. There are special rules for counting such priors and ASSYST will make the computations automatically.

*Sentence Calculations*

By describing the offense and applying the aggregation and grouping rules required by the guidelines, the user can determine the offense level that is referenced in the guidelines' sentencing grid. Likewise, by describing the offender's criminal history, the user can determine the criminal record level. At this point, the user can specify special aggravating and mitigating conditions that may increase or decrease the severity of the sentence. Taking all these facts into account, ASSYST will provide a recommended guideline range.

*Finishing*

ASSYST allows users to save their work and return to their worksheets at a later date. If a user decides to save the worksheet, he or she can replace any earlier version or save all earlier versions.

***The Major Goals of ASSYST***

There were several reasons why the Sentencing Commission endorsed the development of ASSYST. The first reason was guideline complexity. In addition to knowledge about guideline application, a user is required to make a number of calculations, especially for drug offenses. A program that could reduce errors would benefit everyone in the Federal criminal justice system. Of course no program could eliminate errors. Indeed, a user needs to know the guidelines in order to apply them, with or without a program. Nevertheless, an unassisted application of the guidelines leaves

WORKSHEET C (CRIMINAL HISTORY)							
Birth Date (m/d/y)	Offense Date (m/d/y)	Under Crim. Justice Control (Y/N)?	Defendant has record? (Y/N)				
4/5/47	11/10/87	Yes	Yes				
Crime Date (m/d/y)	Impos'n Date (m/d/y)	Adult? (Y/N)	Description	Sentence	Prison Rise Date (m/d/y)	Pts.	

FIGURE 11

room for mathematical and logical errors that can be eliminated by a computer program.

The program was also developed to simplify a probation officer's task of computing and modifying guideline worksheets. The ability to recall a worksheet, make modifications, and print out a new one is a great potential timesaver, especially if the modifications required recalculating offense levels or other mathematical parts of the particular application. Further, it was hoped that the lookup procedures for commentary and other such program features would save time and make the Guideline Worksheet task more efficient.

ASSYST was also developed to collect data. The Commission was required by the enacting legislation to monitor the use of the guidelines. Once guidelines were fully implemented, the number of guideline cases was estimated to be about 50,000 per year. ASSYST could be used to record guideline data as a by-product of producing the Guideline Worksheets. The Commission currently records guideline and other related materials in a large data base by keying information from reports forwarded to the Washington office. As of yet, there is no mechanism for the electronic gathering of data through ASSYST; however, this may occur in the future.

That the programming of ASSYST was of heuristic value was an extra benefit. A few early guidelines (and a few subsequent amendments) had ambiguities and logical inconsistencies. Writing a program that implemented the guidelines helped uncover those problems. As an ongoing process within the Commission, ASSYST developers uncovered and reported inconsistencies and other illogical or incomplete guidelines to the guideline drafters, who then corrected the guidelines. Thus, the program was instrumental in helping to refine the guidelines.

Finally, ASSYST was developed with an eye towards its utility as a training aid for people learning the guidelines. ASSYST allows the user to focus on the substantive issues related to guideline applications, while the mechanical computations are handled by the program.

#### *User Friendly*

There are 95 Federal district courts. Each district court has at least one probation office. Although these probation offices have some communication capabilities with computers in Washington, DC, these capabilities were used primarily for the transmission of data to the Statistical Analysis and Reports Division of the Administrative Office of the U.S. Courts. At the time that guidelines were promulgated, most probation offices did not have a single computer on the premises. The Commission was not faced with views

of anti-technology or "computer phobia," but rather with total lack of computer experience.

The need for an expert system that was "user friendly" was paramount. This system had to take a probation officer through the guidelines, step-by-step, with sufficient instruction along the way. The system had to assume minimum computer training. These needs meant that ASSYST had to be self-installing, self-instructing, and, as a practical matter, menu-driven.

As a result, the system on a whole is "menu driven." This means that throughout the program, the user is presented with a collection of choices on the computer screen, one of which is highlighted in reverse video. At most points in the program the most logical choice is highlighted, but by using the up-arrow and the down-arrow on the keyboard, the user can move the "highlight bar" to different choices. When the desired choice is highlighted, the user hits the "Enter" key to execute that choice.

In most cases, choosing a menu item will invoke another menu, and so on, until a linear decision process is completed. One can imagine an inverted tree with many levels of branches. At each node where branches begin, there is a menu. Each selection will cause the user to traverse a particular branch to a new node that is represented by a menu. At the last level of a particular path, the user can reverse his or her course and travel back up the branches. The user has the option of traveling part-way up a branch and then down other branches. This is made possible by assuring that each menu provides the option of "return to previous menu."

A menu-driven system is necessary for making the program "user friendly." A menu-driven program alone, however, is not sufficient for user friendliness. In addition, the menu structure must be logical and intuitive. The menu choices must be clear, and the user must know "where he or she is" in the program at any given time. This can be facilitated by a menu design that is similar in structure to the algorithm that would be used in the absence of the computer program. Our choice, as we mentioned above, was to build ASSYST around the Commission's worksheet.

Additionally, certain menu choices, given specific circumstances, will be illogical. The program does not allow illogical choices to be made, and unambiguous error messages appear which explain the nature of the problem and the correct course of action. So, for example, the program will not allow a user to compute the guideline sentence before any information is entered about the offense. On the other hand, the program will allow information to be entered about criminal history before offense information, or vice versa, since neither

is dependant upon the other. This feature of the program was developed with state machine logic.<sup>10</sup>

Finally, the program was designed so that the user cannot "crash" it. The worst response allowed by the program is akin to "You can't do this, you must do that." But at no time may the program give illogical or incorrect results, no matter what kind of data may have been entered. This is more than a matter of tightly designed menus. The guidelines had to be examined for ambiguities and strange data patterns. Not every conceivable entry could be contemplated or tested, but a rigorous examination of the assumptions built into the program was conducted, and we implemented proactive and reactive procedures to identify and correct errors uncovered in field applications. As with many large systems of this complexity, however, it may still be possible to crash the program.

#### *Program Data Base*

The program, to be of practical value for both the users and for the Commission, needed to maintain an internal data base. Users needed to be able to stop and save worksheets while in the middle of an application, to recall previously stored worksheets, and to print them out. Just like with a tax form, a small change in guideline application could cause almost every number after it to change. This flexibility to change a worksheet had to be built into ASSYST.

The program maintains an internal data base that can be accessed through several different indices. The records in the ASSYST data base are indexed on docket number, judge's initials, probation officer's initials, and date of entry. Thus, a probation officer could recall every case that he had worked on, every case that he had done with a particular judge, or any specific case by its docket number. One of the major benefits of the program was that a user could recall a case, make a change, and print a new set of worksheets for the case without reentering or calculating anything else. This feature saves a probation officer a tremendous amount of work.

#### *Simple Algorithms/Decision Paths/Calculator*

Using the term loosely, some called the program an "Expert System." At the other extreme, some detractors liked to call the program a "Sentencing Guideline Calculator." In reality, the program embodies both qualities.

Certainly, a program that acted simply as a user-friendly calculator, or a giant decision tree, would appear to be a minor innovation. Nevertheless, these parts of the program are extremely useful. It's easier to apply the guidelines when all the user has to do is choose "Robbery" and a "20," representing the base offense level, pops up on the screen, along with the five

specific offense characteristics that apply to robbery. When selecting "brandished a dangerous weapon," the "20" changes to a "23," and so on. This automation assures that the user considers all facts made relevant by the guidelines and eliminates the possibility of mathematical error. It also drastically reduces the possibility of transmission errors, a consideration that was central to the Commission's need to collect accurate data to monitor compliance with the guidelines.

Slightly more complicated arithmetic must be followed when applying the guidelines to drug distribution crimes. The base offense level of most drug distribution offenses is predicated on the amount of the substance. The Commission created a single drug table for more than 175 different substances. This table can be used to convert disparate types of drugs to "marijuana equivalency kilograms" which are the unit of measurement used by the guidelines. That is, all drugs other than marijuana get converted to the metric system and then are multiplied by some equivalency factor. Thus, 1 kg of marijuana is equivalent to 5 gm of cocaine which is equivalent to 1 gm of heroin. One can see the utility of a computer program, when considering a hypothetical case of a defendant who was in possession of 8.3 gallons of codeine cough syrup (1 gm of which is equivalent to 12.5 g of marijuana) and 3.2 ounces of Fentanyl (1 gm of which is equivalent to 31.25 kg of marijuana).

The guideline for combining multiple counts is complicated and can be prone to error without computer assistance. Each group of counts must be arranged in order of severity, most severe first. Other groups, depending upon how serious they are compared to the first group, cause the overall offense level to be incremented. Suppose there are six counts to be combined, and the probation officer discovers that the second most severe count didn't involve 3.2 ounces of Fentanyl, but 32 ounces of Fentanyl. That conversion must be recomputed, the second most severe group becomes the most severe group, and all the multiple-count calculations must be repeated. With ASSYST, the user simply recalls the case, changes the 3.2 to a 32, and prints out a new worksheet. All recalculations, including the reordering of count groups by severity, are automatic.

Finally, the algorithm for computing criminal history points is complex and difficult to apply. Many complications arise because age and status (juvenile/adult) condition some of the criminal history rules. This conditioning requires the use of different dates (commitment of prior offense, imposition of sentence for that offense, and date of release for that offense) depending on the defendant's age and status. At the more complex logical parts of the program, such

as this, ASSYST takes on the characteristics of a forward-chaining expert system.

### *Grouping Rules and Statistical Inferences*

One of the most difficult guideline sections to interpret and apply is entitled "Groups of Closely Related Counts," § 3D1.2. These rules were written to aggregate counts based on offenses with a common victim, a common series of criminal transactions, and for offenses that can be characterized primarily by quantity or by continuing behavior. Some offenses as specified by the guidelines are excluded from grouping, e.g., robbery, extortion. Multiple counts of the same offense other than those specifically excluded from grouping are aggregated and, if appropriate, the total quantity of the crime such as monetary loss or marijuana equivalency weight is used to establish the offense level. The most difficult interpretation of grouping involves guideline language that characterizes counts involving the same general type of offense. The commentary to the guidelines denotes that "The same general type of offense' is to be construed broadly and would include, for example, larceny, embezzlement, forgery and fraud."<sup>11</sup>

To implement the grouping rules, ASSYST uses a hierarchical approach with the following steps: (1) All counts are entered separately by the user in any order. These are row entries which allow the user to specify multiples of the same count; (2) the user is asked if any of the counts meet a common victim criterion; (3) if the user has inadvertently entered an offense which cannot be grouped, ASSYST disaggregates this offense and notifies the user; (4) ASSYST puts an asterisk by those entries that have the same guideline offense code, but have been entered on separate rows and are not offenses which must be disaggregated. ASSYST queries the user whether there is some specific reason why these counts should not be grouped. The user is given the opportunity to maintain separate row entries among any or all of these common offenses; and (5) ASSYST then attempts to group offenses based on "the same general type of offense" language used in the guidelines. Since the guidelines are not explicit, and there has been no case history to determine how this grouping interpretation will evolve, the program was written with a table of commonly occurring offense groupings. These groups were based on a stratified random sample of Federal offenders convicted in 1985. Offenses that had commonly occurred together in the past and did not violate the guideline exclusions from grouping were assumed to be the "best guess" at counts of the same general type.

ASSYST notifies the user that an attempt at grouping has occurred after the algorithm has been implemented. The user may then override any grouping he

or she desires. In practice, this statistically based grouping rule is infrequently required. However, in those instances where it has been used, the groupings usually seem reasonable. There are several reasons why this statistical inference was chosen to approximate the grouping rules. Most crimes do meet the criterion of the same underlying transaction or harm and, therefore, empirically established past patterns of behavior should predict future common transactions. Secondly, to the extent criminal activity is rational or at least integrated around a common goal, one would expect some common underlying harm to be driving the criminal behavior. Nevertheless, we planned to modify the statistically based table as experience with the guidelines accumulated.

### *The Program—Technically*

ASSYST is written in C, using the Lattice C compiler. Windowing is maintained using the proprietary software, Panel Plus II. Panel Plus II handles all windowing functions that require input from the user, including editing and menu response. The routines are written hierarchically so that primitive functions handle basic input and output capabilities, and the more sophisticated functions rely on the primitives. The availability of the source code allows complete flexibility in window programming. ASSYST uses over 200 windows (including different menus). The efficient, dynamic allocation of memory procedures used by Panel Plus II makes the window creation unnoticeable to the user.

An important feature of Panel Plus II is that the windows themselves can be easily created by someone without programming skills. Panel Plus II provides an editor to create and modify windows so that with very little training, we were able to gain assistance from research assistants in the preparation of windows.

We used a second proprietary software package: dBc+. dBc+ provides a number of function calls with a variety of parameters that allow one to create, store, retrieve, and modify records in indexed files. dBc+ produces true dBase compatible files and was used to store defendant worksheet records and all of the help files used in ASSYST.

ASSYST will run on an IBM PC or clone and requires DOS 2.1 or higher. The memory requirement is 640k. By using dynamic memory allocation, ASSYST typically uses about 500k to 540k of main memory storage at any given time. Aside from the help files taken mostly from the guidelines, ASSYST relies on other data files which are typically read in as tables. These tables exceed 50k of storage.

We have briefly mentioned the state machine logic which is used to assess the implications of the user's menu selection choices. Because there is a certain

order in which computations proceed in the guideline calculations, the state machine was a logical choice for assessing the order in which information can be entered or calculated. ASSYST warns the user and describes the logical error when choices are made in an incorrect sequence. Context sensitive help was implemented by modifying a string which provides a "map" to the appropriate help file. This conceptually works like a stack, which is modified at menu decision points during execution. The help functions translate the string "map" into an index pointing to both the appropriate file and record where the various help information is stored.

### Conclusion

The ASSYST project has been valuable. ASSYST is one of the few expert systems to be implemented in the public sector.<sup>12</sup> Not only is it interesting from an academic point of view, but as an heuristic tool, it helps with the development of the guidelines (and subsequent amendments), and, as a final product, it incrementally increases the efficiency of the Federal criminal justice system. Although the process of developing ASSYST helped to improve the coherency and consistency of guidelines, a more rigorous AI approach might have been employed. Using a more formal AI language such as PROLOG may have helped in uncovering some of the inconsistency. Unfortunately, both the guideline writers and the ASSYST developers were under time constraints to produce their respective products, a workable guideline system and a computer program to help implement the guidelines. Further development may benefit by a shift to, or a combination of, the menu features already developed, supplemented by a PROLOG inference engine.

A major factor in getting ASSYST off the drawing board and into end-users' computers is that ASSYST is not a full blown AI (Artificial Intelligence) legal reasoning expert system. Nevertheless, ASSYST is a major step in such a direction. Its use proves its

feasibility and value. This incremental step should help other AI products in the legal field, both in terms of knowledge gained and in terms of user acceptance.

### NOTES

<sup>1</sup>United States Sentencing Commission, *Guidelines Manual*, October 1987.

<sup>2</sup>P. Jackson, *Introduction to Expert Systems*. Reading, MA: Addison-Wesley, 1986.

<sup>3</sup>R. Gruner, "Thinking Like a Lawyer: Expert Systems for Legal Analysis," *High Technology Law Journal*, 1987, pp. 259-328.

<sup>4</sup>United States Sentencing Commission, *Sentencing Guidelines*, Ch.2 (Nov. 1989). Hereinafter, this article uses U.S.S.G. as the designated short form of citation.

<sup>5</sup>U.S.S.G., Ch.3.

<sup>6</sup>U.S.S.G., Ch.4.

<sup>7</sup>As this article was submitted, changes to the guidelines, that will become effective on November 1, 1991, were being made. As a result, some of the figures, herein, will not reflect the current version of ASSYST.

<sup>8</sup>The words "wholly included in conviction counts" are not guideline language and will likely be unfamiliar to users. ASSYST uses them in an attempt to determine whether all of the criminal behavior included in the conspiracy is fully covered by other conviction counts. For example, if a defendant is convicted of one bank robbery and a conspiracy to commit two others, the user would have to enter the other two robberies as underlying counts. This requirement is consistent with the guideline's treatment of conspiracy, aiding and abetting, accessory after the fact, and misprision of a felony.

<sup>9</sup>This firearms definition will be different under proposed amendments that will become effective November 1, 1991.

<sup>10</sup>A state machine is an algorithm that proceeds through a series of steps known as states. An action is performed in a current state, and the next state is performed depending on the actions of the user in the current state and preceding states. Thus, the main menu in ASSYST is programmed as a state machine. As the user completes certain menu choices, a table is updated to indicate what information the user has completed. This is compared to a table of state machine requirements that form a set of rules allowing menu choices only when they are appropriate.

<sup>11</sup>U.S.S.G., §3D1.2, comment (n.6).

<sup>12</sup>S. Hadden (ed.), *Journal of Policy Analysis and Management*, 8(2), Symposium: Expert Systems.