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EFFICIENT USE OF JURORS: A FIELD STUDY AND SIMULATION MODEL OF A COURT SYSTEM

FREDRIC MERRILL* AND LINUS SCHRAGE**

I. INTRODUCTION

The final reaction of one juror recently serving in a large metropolitan court system to his term of jury service was to place a hand lettered sign on the jury room wall for the benefit of a new crop of jurors that said "They also serve who stand and wait." This perhaps epitomizes the reaction of a large number of people to jury duty. There has been an increasing number of articles in newspapers and magazines over the past few years suggesting that something is wrong with the way some courts are using jurors and that some of the time spent by citizens in jury service is simply wasted.¹

If there is a waste of juror time by our courts it is a problem that has serious consequences. Wasted juror time is wasted money not only to the court system, but to jurors who lose income and incur out of pocket expenses for every day they report, and to some employers who pay jurors for time spent in jury service. Perhaps even more important is the juror's loss of respect for the judicial system resulting from his disappointed expectations, boredom and observed inefficiency.²

In response to this concern over the wastage of juror time, in 1967 the American Bar Foundation began a study of juror utilization. This is a report of the pilot phase of that study, conducted in the Federal

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1 LIFE, May 3, 1968, at 18b; LIFE, Dec. 3, 1965, at 30; NEWSWEEK, June 10, 1968, at 58-59; U.S. NEWS & WORLD REPORT, March 4, 1968, at 44; Christian Science Monitor, June 28, 1968, at 9-10; N.Y. Times, Dec. 5, 1968, at 49.

2 "Every year thousands of citizens are summoned for jury duty, many of them expecting that the world of the courtroom furnishes the excitement and gratification which flows from participating in the dispensing of justice. The sad fact, however, is that an unconscionable amount of the average juror's time is wasted waiting to be called for service in a particular case." Kaufman, *Courts in Crisis: Progress Versus Intransigence*, 52 A.B.A.J. 1026, 1028 (1966). Judge Kaufman, Chairman of the Federal Judicial Conference Committee on The Operation of the Jury System, suggested this research project.

District Court for the Western District of Missouri during an 18 day period in October 1968.³ This phase of the research is referred to as a pilot project because its purpose was not only to suggest areas where modifications in court operation might reduce waste of juror time, but also to develop efficient methods of securing factual information on juror use that will be used for future study of a large complex court system.

Before beginning field work in the Western District of Missouri, several basic decisions on research design were made. The area of research was limited to efficient use of juror time. Improved working conditions, such as better explanations of the cause of idle time or more attractive jury rooms, might reduce juror dissatisfaction. However, since such improvements do not go directly to the question of reducing inefficiency, they are not included in the study. It was further decided that systems analysis and computer technology might be useful in eliminating some problems of juror time use and should be investigated. However, such techniques are not a panacea for all juror time use problems and are only to be considered as a partial answer to certain types of problems. The purpose of the research was to make a total analysis of juror time use.

We realized that not all juror idle time was wasted time which can or should be eliminated. Allowing litigants to regulate their own cases and to settle their dispute at any point increases the irregularity of the demand for jurors and the waiting periods for the jurors. There are other interests in the trial system, *i.e.*, litigants, witnesses, and courtroom personnel, which under certain circumstances take precedence over the jurors' interests and which result in waiting time. Also, there is no simple standard for identifying what is wasted and what is useful juror time. The pressure of a waiting jury which forces litigants to a settlement of a case disposes of the case just as surely and completely as if the jury had rendered a verdict.

A. The Western District of Missouri

The Western District of Missouri has five judges, one of whom is a senior judge. The central courthouse for the district is located in Kansas City, Missouri. The district has jurisdiction over 66 Missouri

3. An expanded version of this report, containing a more detailed explanation of the results of the study of the Western District of Missouri, will be published by the American Bar Foundation under the title, "A Pilot Study of Utilization of Jurors."

counties and is divided into 5 divisions. The western division of the district includes Kansas City, Missouri.

Cases in all divisions in the district are normally handled through an individual judge and that judge is responsible for scheduling and completing all activity in the case through final disposition. Since 1966, the court has scheduled twice each year an accelerated docket period in the western division of the district. During the accelerated docket period all judges are available to try cases in the western division and cases are assigned for trial to whatever judge is available. The Western District of Missouri has a favorable relation between caseload and judicial resources. This permits far more deliberate planning and more relaxed and flexible trial scheduling in the "accelerated docket." This "accelerated docket" would be a period of relative quiet for most large metropolitan courts.

To prepare the accelerated docket, the clerk checks all cases pending in the western division for cases which are, or should be, ready for trial. Only civil cases which will require less than a week for trial and for which a jury has been requested are selected.

The Western District of Missouri has a comprehensive pretrial procedure. The court supervises the discovery procedure in each case and requires that the parties exchange lists of witnesses and exhibits. Counsel are required to enter an order which a) sets out all uncontroverted facts, b) describes the facts in controversy, c) waives objection to the admission of identified exhibits, and d) at the attorneys' option, identifies legal issues to be settled at the trial. Prior to the trial there is generally a conference between the attorneys and the judge.

Since 1967 the Western District of Missouri has used a master list of jurors compiled from voting lists in the district. The clerk's office sends qualification questionnaires to names on the master list and from the returned questionnaires decides who is qualified for service under the federal requirements.⁴ The names of those persons qualified are typed on cards which are placed in a wheel in the clerk's office. Every month names needed for the jury panel, as decided by the clerk and chief judge (generally over twice the number of jurors needed), are pulled from the wheel. The clerk's office prepares summonses, which are mailed by the marshall's office. Persons summoned are directed to request excuses by mail if they cannot serve. A day or two before the

4 28 U S C. § 1865 (Supp. IV, 1969).

term begins, the clerk's office prepares a final list containing the names, addresses, and occupations of the jurors. Copies of this list are furnished to attorneys trying cases during the term.

At no time does the Western District of Missouri maintain a ready pool of jurors in the courthouse. There is no jury room in the courthouse, and jurors report either to the clerk's office or to a particular courtroom. During the accelerated docket period, however, the court does use a pool system in the sense that jurors are not assigned to any particular judge but are rotated and assigned according to the trial schedule.

During the accelerated docket, cases commence only at 9:30 in the morning. Jurors who are not needed are released to go home and told to report to the clerk's office on another specified day. In some cases the jurors are released and told that they will be contacted by telephone when they are needed. When the jurors report again, they are reassigned by the clerk's office to whatever courts are commencing cases.

Scheduling and directing the jurors' movements is accomplished by the clerk's office, which attempts to coordinate the juror supply with the case schedule. If the clerk's office has 24 hours' notice of settlement or postponement of a case, generally another case can be scheduled or the jurors can be contacted and told not to report. If the notice period is too short, the jurors who report must be sent home. If a case takes less time than anticipated or settles in trial and jurors are not scheduled to return for several days, the next case may not be scheduled until the jurors are due.

Voir dire in the district is conducted by the judge trying the case. The judge asks a list of standard questions plus questions which the attorneys submit prior to trial relating to the particular case. Counsel are allowed to submit further questions to the judge at the end of the *voir dire*.

Generally 26 to 28 jurors are assigned to a case. All jurors are questioned collectively. The judge may direct questions to a particular juror, if that juror gives an unusual response to a general question.

When *voir dire* is completed, the judge recesses the case and retires to chambers with the attorneys and a list of prospective jurors. First the attorneys are allowed to ask that prospective jurors be stricken for cause and the judge rules on these requests. The plaintiff's attorney and defendant's attorney are then allowed to strike 3 names each from the first 18 names remaining on the jury list. At the discretion of the judge

more than three challenges may be allowed, the attorneys may be required to strike alternately, or an alternate juror may be selected.

When the twelve jurors have been selected, they are seated in the jury box and sworn. The rest of the panel is sent home.

B. Field Work in the Western District of Missouri

The data on the operation of the Kansas City court were secured by four methods:

- a) by using the excellent records kept by the clerk;
- b) by observing the court in operation during the period of study;
- c) by having the jurors keep daily time records; and
- d) by having the jurors answer questionnaires at the beginning and end of the period of study.

Jurors serving during October, 1968, reported to the clerk's office in the courthouse on September 27, where they received an explanation of the study and filled out the first questionnaire. The purpose of the first questionnaire was to secure data on juror background and determine juror attitudes about jury service prior to their experience in the Kansas City court.

Each day during the study period, jurors reporting were given a time card and asked to record their activities for that day. Research personnel also observed juror time use and the progress of cases in trial. Daily contact was maintained with the clerk's office regarding the scheduling of cases and the management of jurors.

Since the jurors participating were released from service at different times, the second juror questionnaire was mailed to the jurors. The purpose of the second questionnaire was to determine the attitude of the jurors after completing service and to get information on the cost of service to the jurors and their employers.

II. ANALYSIS OF DATA

Before presenting any research results, we should summarize the scope of the study. The study does not cover general operation of the court but a special accelerated docket; no criminal cases nor cases requiring an extended trial are included. The court is a relatively small court; there are only four judges plus a senior judge. The data must be considered primarily as an illustration of small court operation, and care must be taken in generalizing conclusions to other courts, particularly larger court systems.

The amount of data secured is small. This is due to the size of the

court and also the fact that the data were secured on cases tried in only one division of the district (11 counties), during a very short time period. Only 108 jurors actually served during the docket period; 10 cases were brought to trial and 5 resulted in verdicts.

The small sample size prevents us from deriving clear answers to many of the questions we might ask about juror utilization. The primary purpose of this pilot study was to develop research methods for a more extensive study of efficient juror utilization. Therefore, we attempted a more comprehensive analysis of the Kansas City data than was warranted by the amount of data collected.

In the material that follows, we give first a statistical description of the operation of the court during the study; this includes a description of the jurors, the cases on the docket, disposition of the jurors' time, costs, and juror attitudes. Next the use of the jurors' time is considered in relation to the total operation of the court, and possible modifications of the court that might improve juror use are discussed. Finally, we discuss the use of a computer simulation model of a court system as a tool for examining the effect of changes in court operation.

A. Statistical Summary

1. Jurors

Two hundred and fifty names were pulled from the jury wheel and 108 jurors served during the month of October, 1968. Two jurors refused to fill out the first questionnaire and five jurors did not fill out time cards. Seventy-five jurors returned the final questionnaire.

Of the 108 jurors who served; 73% were men and 27% women; 92% were white and 8% were black; 75% had less than a college education; the median family income was between \$8,000 and \$8,999 per year and the mean family income was approximately \$8,900; 90% of the jurors were married; the mean age was 44.9 years; 48% were working as semiskilled laborers; and 42% had experienced previous jury service.

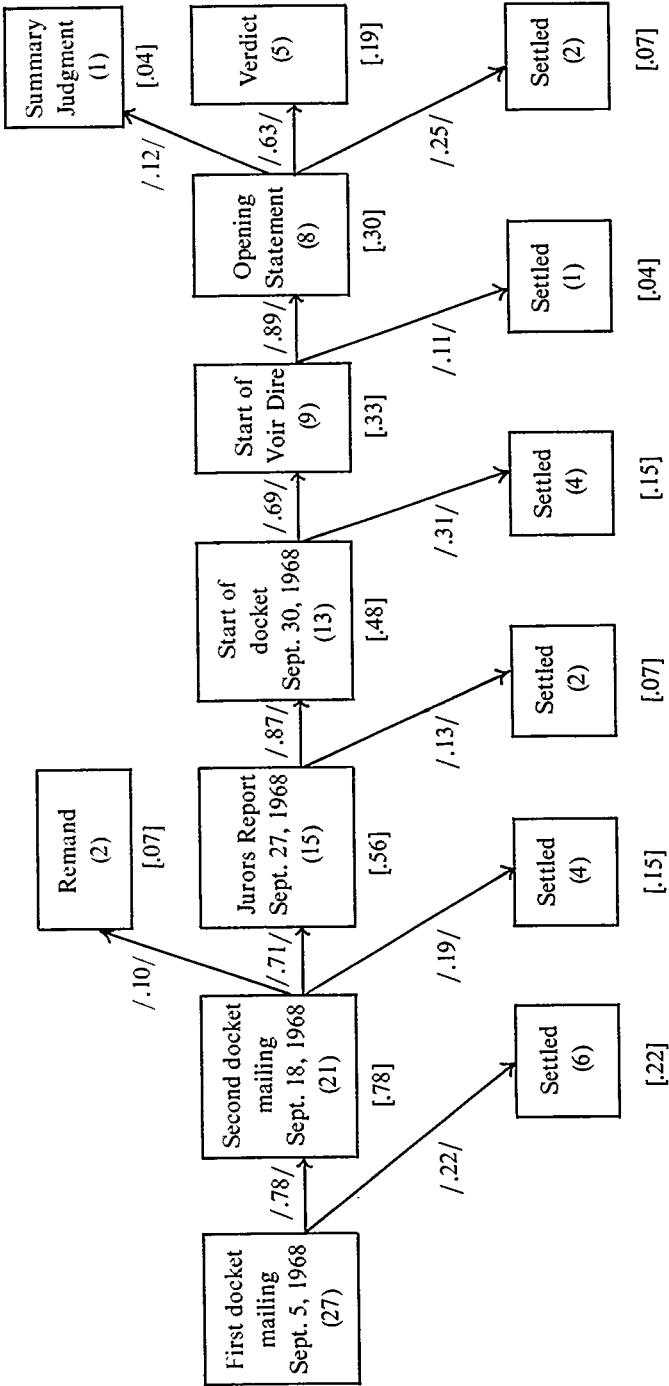
2. Cases

The dispositions of cases on the October accelerated docket are set out in Table I. There were 27 cases on the original October accelerated docket. Twelve cases were settled before the docket period began, and two cases were remanded to state court. Three cases were settled during the docket period but before trial began (one at 8:55 a.m. on the day of trial).

TABLE 1

Termination Summary of Accelerated Docket Starting September 30, 1968.

() indicates absolute number of cases at a stage.
[] indicates proportion of original 27 cases.
/ / indicates proportion of cases at preceding stage.



Ten of the cases on the docket were brought to trial. Five of the cases resulted in verdicts (one after five days of trial, two after three days of trial and two after two days of trial). One case was terminated by summary judgment (in the second day of trial). Two cases were settled after trial began but before the jury was empanelled, and two cases were settled after empanelment but before verdict (one on the first day of trial and one on the second). One of the cases which settled before verdict used jurors who had originally been called for September jury service and who were not included in the study.

3. *Disposition of Juror Time*

The 108 jurors reported for service a total of 420 days and were seated on cases and served a total of 238 days (56.67%).

A more detailed record of juror time use was obtained through the use of the juror time cards and the daily summary. It should be noted that the juror time use covered was time expended by the jurors from when they were scheduled to report in the morning until they were released to leave the courthouse for the day. This does not include juror transportation time to and from the courthouse and time spent by jurors who reported before they were due or stayed in the courthouse after they were released for the day.

The jurors devoted a total of 104,550 minutes or 1,742.53 hours to service. The mean time devoted by jurors to service per day reported was 4.15 hours.

The use of juror time may be characterized profitably in two dimensions. One way of classifying juror time use is according to the type of activity in which the jurors were engaged, *e.g.*, *voir dire*, waiting, trial. A second way to classify time use is according to how the jurors' service in a particular case terminated; this provides 4 possible classifications:

- 1) never reached on trial list
- 2) challenged
- 3) selected for jury but case ended before verdict, and
- 4) rendered verdict

Table 2 presents the jurors' time use in both dimensions.⁵ The table

5. In Table 2, the column headings distinguish time use according to how the jurors' service on the case terminated and the row headings distinguish time use according to activity. The following is a reproduction of the first cell in the upper left corner of the Table with a description of the meaning of the four figures it contains.

615	17%
11%	1%

shows that 50% of the jurors' time was devoted to trial and deliberation, and only 7% for waiting; that 72% of the jurors' time resulted in the jurors' rendering a verdict, and that 46% of all the jurors' time was devoted to trial or deliberation in cases where the jurors rendered a verdict.

4. *Cost of Service*

In addition to considering juror time in hours or minutes it might be helpful to attach a monetary value to that time. This turns out to be an extremely difficult task. The problem is that different monetary figures might be used depending upon whether one refers to cost to the court, cost to the juror, juror's estimate of value, or some overall social cost.

One obvious means is the cost of the court. The 108 jurors serving on the October, 1968 jury panel were paid jury fees of \$4,020.00 and mileage of \$1,471.40 for a total of \$5,491.40.⁶ Dividing this total by the total time devoted to service, the cost of the jurors' time is 5.252 cents per juror minute, \$3.15 per juror hour, or \$13.07 per juror day.

Since jury service is theoretically mandatory, fees and mileage paid do not actually reflect the value of time to the jurors; the fee is in no sense a market price. Jurors were asked how much they had received from their employers for time spent in jury service. They were also asked how much they lost in income attributable to jury service (for jurors who received employer payments, this would be the difference between those payments and normal income for the period of the service). Finally, the jurors were asked to report any out-of-pocket expenses attributable to jury service.

Seventy-one jurors reported a total cost of \$6,434.00. Dividing this

615 (minutes) is the time spent in Pretrial Wait by jury members who were Not Reached on List. 17% indicates that 615 minutes is 17% of the total time (3,720 minutes) spent by jurors in service who were Not Reached on List.

11% indicates that 615 minutes is 11% of the total time (\$5,505 minutes) spent by jurors in Pretrial Wait

1% indicates that 615 minutes is 1% of the grand total of time spent by all the jurors in service during the whole October docket.

6. These figures do not include fees and mileage for (a) the October jurors reporting on September 27 for orientation; and (b) the September jurors who served on one case on the October accelerated docket. The time totals, however, do not include time for these two occasions. Fees were not paid to five federal government employees who served a total of 18 days. Note, also, that the jurors were paid at the rate of \$10.00 per day and 10 cents per mile. The fees currently paid under the new federal jury act are \$20.00 per day and 10 cents per mile. 28 U.S.C. § 1871 (Supp. IV, 1969)

TABLE 2

(see footnote 5 for explanation of table)

TIME ACCORDING TO HOW JUROR SERVICE ON CASE TERMINATED

	Time According to Activity	Juror Not Reached On List	Juror Challenged	Case Ended Before Verdict	Jury Rendered Verdict	Row Total Time and %
Pretrial Wait	615 11%	17% *	1,350 25%	1,905 35%	1,635 30%	5,505 5%
Voir Dire	1,500 14%	40% 1%	3,165 30%	2,595 25%	3,210 31%	10,470 10%
Challenge Recess	1,530 16%	41% 2%	3,150 33%	2,625 27%	2,265 24%	9,570 9%
Waiting for Release	75 4%	2% *	270 14%	1,410 73%	180 9%	1,935 2%
Trial & Deliberation	—	—	—	4,748 9%	47,730 91%	52,515 50%
Lunch and Other Breaks	—	—	—	2,775 14%	17,540 86%	20,315 20%
Other Recesses	—	—	—	1,800 42%	2,440 58%	4,240 4%
Column Total Time and %	3,720	3%	7,935	17,895	75,000	104,550

*Indicates that the percentage was less than 0.5% and was dropped and the other figures adjusted accordingly. Due to rounding, some of the cell percentages do not sum to the appropriate row and column percentage totals.

GRAND TOTAL Time in Min. 104,550

GRAND TOTAL % of time—100%

total by the amount of time devoted to jury service by these 71 jurors, a cost of 8.903 cents per juror minute, \$5.34 per juror hour, or \$23.05 per juror day is derived. If we assume that the reported costs are **representative** of costs incurred by all 108 jurors, we can multiply the **total** time for all jurors by the cost per minute for the reporting jurors and get a total loss of \$9,308.09.

Using the cost reported by the jurors as a measure of value has **several** problems. First, some jurors apparently confused loss of income to themselves, payments by their employers, and jurors' fees paid. **Second**, twenty of the jurors in the sample were not direct income producers (e.g., housewives or retired); asking these jurors questions about direct loss of income does not allow them to attach any value to their time. Finally, the jurors may have put a higher or lower dollar value on time spent in jury service than they did on time spent working at their regular occupation due to intangible factors involved in jury service, e.g., fulfilling a civic duty, disruption of normal routine, etc.

A better measure of value may be what the jurors thought they should have received for service. The jurors were asked this question after they had completed their service. Sixty-one jurors responded and the mean amount they requested per juror day was \$18.59. If we multiply this by the total days served we get a value of \$7,807.38 for the total time expended by the jurors. In addition, most of the jurors indicated that the figure they gave was for fees only and that mileage should also be paid. Adding the amount of mileage that was paid gives a total requested payment of \$9,278.78. This breaks down to 8.875 cents per juror minute, \$5.32 per juror hour, or \$22.00 per juror day.⁷

7 None of the figures given in this section is a complete measure of the total cost to society of the juror time.

First, there is an element of disruption cost to the jurors and their employers which results from **having** the juror work at something other than his regular occupation and breaking his regular routine. The cost to the court and the losses reported by the jurors do not include this; it may be **one** of the intangible elements that affected the jurors' requested amount per day.

Another aspect of value that clearly is not included in the amount paid by the court or requested by the jurors is the indirect cost of the jury system to the court, e.g., costs of selection—and summoning and management of jurors. This cost could be characterized as a difference between **what** it currently costs to operate the court system and what it might cost to run the court system if **there** were no jurors. Allocating this cost directly to juror time is currently neither possible nor **desirable**. We are not sure that a reduction in the amount of time spent in juror service would **have** any effect on the overall cost of court operation and it may be that such a reduction would **result** in an increase of operating costs. The simulation model to be discussed, however, may **provide** a method of relating these costs to juror time use.

5. *Juror Attitudes*

Another way to look at the cost of inefficiency is in terms of the effect of service on juror attitudes toward the court system.

The approach of the majority of jurors to service was extremely positive. The jurors expected their service to be pleasant and they apparently found it so. Typical juror comments were: "I think it will be an interesting and important service to my country"; "I like the feeling of participation and the part being played in proving your worth as a citizen"; "I like to see a real case in action—not just a T.V. show—I think the judges handle the courts well in dealing with people not involved in the court every day"; "I now have a wider knowledge of what really goes on in a courtroom—before, my only knowledge of this was Perry Mason."

Before service, only 6% of the jurors said that serving on a jury was an extreme inconvenience and 10% of the jurors responded negatively when asked if they expected service to be pleasant or unpleasant. Only 3% of the jurors expected service to be a waste of time and 77% said they expected service to be a good use of their time.

After service, 88% of the jurors who responded said they would be willing to serve on a jury again under conditions similar to those they had just experienced. Only 9 (12% of those responding) indicated that they would be unwilling to serve again, and of these 9, only 1 stated that he was unwilling to serve again due to conditions of service. The other gave financial loss, transportation, and family problems as the reasons for reluctance to serve. Only 3% reported that they were less in favor of the jury system after service than before.

Perhaps the best measure of the jurors' attitudes toward service is change in attitude over the period of service. The jurors were asked identical questions relating to pleasantness and utility of service on both the initial and final questionnaire; of the jurors who responded to both questions, 49% found service more pleasant than expected and only 9% found it less so; 25% found service a better use of time than they had expected and 17% found it less so.

B. Methods of Improving Court Operation

One cannot simply single out areas where changes might be made that would reduce juror time consumption and suggest without further thought that these changes be made. Most improvements in juror time use would result from changes that have effects elsewhere in the court system. We are interested only in changes in the existing court system

that improve jury utilization and at the same time improve total operation of the court. The method of analysis is essentially very simple. We identify specific modifications in the court system which reduce the amount of juror time used; we then assess the cost of this change and compare this cost with the benefits resulting from the change.

The simplicity of the suggested method, however, does not mean that doing the analysis is easy. Precisely identifying changes affecting juror use is difficult and it is even more difficult to measure costs and benefits.

One measure for costs and benefits is monetary. For example, elimination of time put in during the study period by jurors who were not reached on the juror list would result in a saving of \$331.19; elimination of time which resulted in jurors being challenged would result in a saving of \$706.45; and elimination of time put in by jurors on cases which ended before a verdict would have resulted in savings of \$1,593.19.⁸

It is not suggested that the computed savings set out above could or should be entirely realized. If, however, a suggested modification in court management or procedure would result in a partial saving of juror time, the dollar value of this time could then be weighed against the cost to the entire court system. For example, it might ultimately be determined that calling a specified fewer number of jurors for the monthly panel would result in a fifty percent reduction in the time devoted to service by jurors not reached on the trial jury list. Calling fewer jurors, however, probably would result in the increase of idle court time due to unavailability of a full jury. If we could assign a dollar figure to the cost of having the court idle, this would allow an easy comparison of the cost and benefits of calling fewer jurors to the monthly panel.

The problem is that in many areas it would be either impossible or undesirable to assign dollar figures to costs and benefits. For example, to reduce the cost of time spent by jurors who are eliminated from the panel by challenge, one might restrict the freedom of the parties to exercise challenges; one cannot, however, attach a dollar value to the right to challenge.

It appears that the area of concentration that will produce the highest saving of juror time at the lowest cost to the court system is

⁸ Valuation based upon amount jurors requested as a fee, plus mileage.

that of administrative management and planning by the court. This includes planning jury supply and demand; improved calendaring and scheduling practices, improved jury control and direction, careful allocation of court resources to jury trials; and improved direction of the conduct of trials. There are two other areas that would clearly reduce juror time use but at an apparent high cost to the court system: changes in basic trial procedure and increasing court size. These are discussed briefly.

1. Administrative Management and Planning

Within the limits imposed by the basic rules of procedure, trial courts have a great deal of administrative discretion as to how the court shall function. Summoning and directing jurors, scheduling cases for trials, and allocating court resources are all areas where a constant series of administrative decisions are made that have a crucial effect upon juror time utilization.

2. Planning Juror Supply and Demand

One administrative modification that might provide great improvement in juror time use at very low costs is improved prediction by the clerk's office of juror demand and supply. The cost of improved prediction is usually the cost of improved data collection and analysis. The courts already do most of the basic data collection so that analysis is the main additional cost. In general the benefit of improved prediction is improved scheduling, *e.g.*, there are sufficient jurors on hand when a new trial is to be started; there are few idle jurors at other times. Improved prediction allows a better balancing of the opposing costs of juror idle time and the cost of running out of jurors, *i.e.*, court idle time. As you call in more jurors, juror idle time increases and court idle time decreases.

One prediction that must be made is the number of jurors who will report for service. Not all persons who are summoned report for service. Some are excused for various reasons; some are no longer qualified or are deceased; some simply never respond to the summons. The ratio of service to summons is the end result of the court's practices in summoning and excusing jurors. Assuming that these practices do not change, then prediction of the number of available jurors can be based upon past experience. For example, the figures for the study period in the Western District of Missouri show that 43% of persons summoned actually served. The data are probably not sufficient for accurate prediction because the time period covered was

too short: at different times of the year, such as harvest or vacation time, differing numbers of persons may seek excuses; and, as the time interval between qualification questionnaires and summonses increases, the number of persons responding will decrease due to deaths, moves, changed health, and other circumstances.

Juror demand is a more difficult prediction. At the simplest level, juror demand is determined by the number of cases that will reach the trial stage and require jurors. To predict this we need a prediction of when cases set on the trial docket will terminate. A careful analysis of past dockets should provide a basis for prediction of termination of cases on the docket. For example, Table I could be used by the clerk to predict that 33% of the cases set on accelerated trial docket will begin trial and require jurors and 44% of cases beginning trial would settle before verdict.

Even finer predictions could be made by considering the type of cases set on the docket. Table 3 classifies the type of cases on the October 1968 docket by the stage at which the case terminated. There are insufficient cases to make definite statements but the Table does suggest that personal injury cases are more likely to settle early than any other type; that insurance coverage cases tend to settle later in the process but before trial; and that eminent domain cases are more likely to go to trial. If a larger sample of cases were available for analysis, it might be possible to develop finer ways of classifying cases in terms of probable settlement.

Another type of demand prediction that could be useful is length of trial and *voir dire*. The cases that reached trial during the accelerated docket period required an average of 84 minutes for *voir dire* and 497 minutes for trial.⁹ Since it requires more jurors to conduct a *voir dire* than a trial, there are two things that tend to increase juror need, short trials and a higher ratio of *voir dire* time over trial time. Trial and *voir dire* length predictions could also be refined according to the type of case. For the Western District of Missouri, the cases which required explicit use of jurors could be classified into three types: personal injury—auto, personal injury—non-auto, and eminent domain. For personal injury—auto the mean trial time was 411 minutes and the mean *voir dire* time was 69 minutes (16.8%). For personal injury—non-

⁹ Length of *voir dire* as used here means the length of time from the beginning of *voir dire* until the point where the jury is sworn, which is also the time when the excess jurors are released. Length of trial includes all recesses other than lunch recesses because it was felt that the number and length of these recesses might be affected by the type of case.

auto, the mean trial length was 577 minutes and the mean *voir dire* length was 107 minutes (18.5%). For eminent domain cases the mean trial length was 530 minutes and the mean *voir dire* length was 80 minutes (15.1%). These figures suggest that if the docket was a high concentration of personal injury—auto cases ready for trial, the clerk should call more jurors than if there were a high proportion of eminent domain cases ready for trial.

Another area of possible prediction is the number of jurors that will be required for a *voir dire*, i.e., the number of challenges. In nine civil cases (excluding the one case using September jurors) the court assigned an average of 28 jurors to each case. Taking the 8 cases where *voir dire* was completed, an average of only 22 jurors per case was used. On this basis it might be suggested that 28 jurors is too high a number to assign.

It must be recognized, however, that the Western District of Missouri has a special problem in the number of jurors assigned to a case. Without a ready pool of jurors the consequences of exhausting the panel are serious because there are no additional jurors available if a case uses more jurors than the average. In this situation it is not proper to use averages; maximum juror demand is more important than average juror demand; e.g., in one case in our sample all 25 jurors on the panel were used.

If several *voir dire*s are beginning simultaneously, the excess from one could be used to furnish extra jurors to the others. Jurors employed in the neighborhood of the courthouse could also be on immediate call. Another solution would be to reduce the number of jurors needed for the case if the panel were exhausted. This could be done by having attorneys stipulate in advance to try the case with 10 or 11 jurors if the panel did not prove sufficient to provide 12.

Use of an alternate juror increases the number of jurors used in a case by at least 3 (one juror plus two challenges).¹⁰ The court might ask the trial judge to determine in advance if an alternate juror is to be used and take this into account in determining the number of jurors to be assigned to that case.

The court might consider the nature of the jurors in deciding on the size of the panel. It is possible that certain classes of people might be more challenge prone than others. The clerk does not have the right to

10. This is not meant to suggest that use of an alternative juror decreases overall juror efficiency. It may increase it by avoiding mistrials.

TABLE 3
TERMINATION TIMES ACCORDING TO TYPE OF CASE

Type of case	Before 2nd Docket Mailed	Before Jurors 1st Report	Before Start of Docket	Before Start of Voor Dire	Before Opening Statement	Before Verdict	Verdict	Total
Personal Injury —Auto	4 (.3.1)	3 (.3.1)	2 (.1)	1 (1.6)	1 (.1)	1 (2.6)	2 (1.6)	14
Personal Injury —Non-auto	1 (.9)	0 (.9)	0 (.3)	0 (.6)	1 (.3)	2 (.7)	1 (.4)	4
Eminent Domain	0 (1.1)	1 (1.1)	0 (.4)	1 (.6)	0 (.4)	1 (.9)	2 (.6)	5
Insurance Coverage	0 (.7)	2 (.7)	0 (.2)	1 (.4)	0 (.2)	0 (.6)	0 (.3)	3
Bankruptcy— Distribution of Funds	1 (.2)	0 (.2)	0 (.07)	0 (.1)	0 (.07)	0 (.2)	0 (.1)	1
Total	6	6	2	3	2	3	5	27

Entries in Table are number of cases. Entries in () are number of cases of a particular type which one would have expected to be terminated at a particular stage if the probability of settlement were independent of the type of case. For example, there were 14 personal injury—auto cases. If personal injury—auto cases were typical cases we would expect $(6/27)$ proportion of them to be settled before the second docket mailing. Thus, the expected number of personal injury—auto cases completed before second docket mailing is $(6/27) \times 14 = 3.10$.

exclude people from the *venire* based upon the likelihood that they will be challenged. He could, however, assign a minimum number of people and then determine if the number of challenges was likely to be high and, if so, assign extra jurors.¹¹

Most of the classes that were examined show no overwhelming tendency toward challenge. The only statistically significant result that was reached was the relationship between cause challenges and previous connection with an insurance company (Table 4). In the other groups examined there was some relationship between demographics and challenges.¹² For example, women were more frequently challenged than men (40% vs 35%); older persons (over 50) were more frequently challenged than younger (47% vs 27%); people who had attended college were more frequently challenged than those who had a high school education or below (46% vs 34%).¹³

3. *Other Management Changes*

Simply knowing probable juror supply and demand will not guarantee that juror time will not be wasted. In the first place, the predictions are still only predictions with some probability of error. The court must be operated with sufficient flexibility to accommodate those errors. In the second place, when predictions are correct, the court must manage and control jurors and cases properly or juror time will still be misused.

It is suggested that there are four key areas of management that have the greatest effect on juror time use and must be given attention:

1) *Juror direction and control.* This includes the court's practices in summoning, assigning and releasing jurors.

2) *Trial scheduling.* This includes the court's practices in setting cases for trial and granting continuances and in maintaining communications with litigants regarding settlements and readiness for trial.

3) *Allocation of court resources.* This includes having judges, courtrooms and supporting personnel available for trial according to schedule and developing enough flexibility to meet changes in schedule.

11. If there are actually challenge prone jurors, this might also be a factor for the court to take into account in excusing jurors. Another tactic might be to adopt a rule that anyone who was challenged three or four times in succession could request and receive an excuse.

12. Generally, we examined the relationship between the number of times jurors in each class served on a *voir dire* panel (which can be called exposure) and the number of challenges. For the entire group of jurors, there were 214 exposures and 78 cause and peremptory challenges (36%). Cause and peremptory challenges should have been considered separately but we did not have enough cases in our sample to do this.

TABLE 4

Are Former Insurance Company Employees More Likely to be Challenged For Cause?

(ALL JURORS PARTICIPATED IN AT LEAST ONE VOIR DIRE.)

	FORMER INSURANCE EMPLOYMENT		ROW TOTAL	ROW PERCENT
	EMPLOYED	NOT EMPLOYED		
CHALLENGED FOR CAUSE	43.7% 7	14.6% 13	20	19.0%
NOT CHALLENGED FOR CAUSE	56.2% 9	85.4% 76		
COLUMN TOTAL	16	89	105	100.0%
COLUMN PERCENT	15.2%	84.8%		

CELL PERCENT BASED ON COLUMN TOTAL

Yates Chi Square — 5.700 (continuity corrected)

Significant at the .02 level

(3 subjects did not respond to this question)

4) *Trial management*. This includes control by the judge over commencement of trial, court hours, recesses and adjournments.

With the information secured from this pilot study, no generalizations may be made as to the best practices for administration of all courts. It is possible that the exact techniques must vary from court to court to meet differing needs and circumstances.

The Western District of Missouri appears to operate with a high concern for juror time use and a high degree of administrative efficiency. The court plans well, reacts efficiently to schedule changes and is willing to accommodate its case schedule and resource allocation to the juror supply whenever possible. This may in some instances be at the expense of trial production but the court's docket is reasonably current and the pressure to try cases is not great. The accelerated docket period studied was unusual and these conclusions may or may not hold for the individual calendar operation of the court. It also should be noted that this study took place over a very short period of time in a manner that was extremely visible to the judges and clerks which may have resulted in extra efforts to conserve juror time.

Only several minor suggestions may be made:

1) During the last week of the study period, the number of jurors reporting for *voir dire*s increased substantially. This resulted in an increase in time devoted to jury service where the juror was never reached on the jury list (in one case, which used a September jury, 43 jurors reported as compared to a normal 28).¹³

2) Since the court generally rules on challenges for cause at the beginning of the challenge recess, the court should release jurors challenged for cause immediately rather than waiting until the end of the challenge recess and the swearing of the jury.

3) A recurring problem in juror scheduling is a case settlement where jurors cannot be contacted in time to tell them not to report. The court might consider using a recorded telephone message system and having jurors call to make sure the case for which they are scheduled has not been settled or postponed.

4. *Procedural Changes*

The most dramatic reductions in juror time use could be achieved

13. It should be noted that these relationships are not strictly independent. For example, the mean age of the women is greater than that of the men. Therefore, the number of challenges may be related to age or to sex alone, or to both age and sex.

14. The calling of the larger panels during the last week appears to be an administrative rather than a predictive error. There was no indication that the clerk's office felt that these cases would require more jurors.

by making some changes in trial procedure. In this category it could be suggested that juror efficiency would result if changes such as the following were made: different pretrial procedures; changes in the *voir dire* and empanelment procedures; modification or elimination of the challenge right of litigants; changing the calendaring system and using absolutely firm trial dates without continuances; elimination of summary judgments, directed verdicts, and mistrials; and strictly controlling the parties' presentation of their cases so that only a certain amount of time would be allotted to each case.

It is obvious that some of the changes suggested above are so basic that adopting them would completely change the American trial system. There are several procedural modifications which might have a less drastic result.

It is probable that if pretrial procedures were more exhaustive, fewer cases would reach trial and those that did reach trial would require less juror time. The exchange of lists of witnesses and copies of exhibits, narrowing of issues of law and fact and conferences with the judge that occur during pretrial in the Western District of Missouri may promote earlier settlement and avoid lengthy recesses during trial. An additional benefit of pretrial procedures may be the reduction of problems of trial scheduling. Unexpected settlement or continuance of a case immediately prior to or during a trial is one of the principal problems in jury scheduling and one of the primary causes of jury idle time. Use of the procedures followed in the Western District of Missouri and perhaps an affidavit of good faith attempt to settle by the attorneys may reduce the number of unexpected settlements or continuances. To reduce continuances the court might also modify its practices in allowing or refusing continuances and use certificates of readiness. The resulting savings in juror time must be balanced against the extra cost and inconvenience to the court and attorneys from these pretrial procedures.

Another area of modification which might result in some saving of juror time is *voir dire* practice. Although elimination or limitation of the right to challenge does not seem particularly desirable, the procedures followed to allow the parties to exercise this right probably affects the length of time necessary for *voir dire*. Whether the judge, the attorneys or the clerk question the jurors and whether jurors are questioned individually or collectively has a direct effect on juror time use.

These modifications would involve some cost to the court and

litigants but they do not seem to be as "expensive" as some of the more basic changes in procedure. At this point, it is impossible to make any judgments about the effect of such modifications on juror time use beyond suggesting that the one element of the efficiency in the Kansas City court may be the extensive pretrial procedure and court control of *voir dire*.

5. *Changing the Size of the Court*

If there is juror idle time in a court system, one way to reduce juror time use would be to increase the number of judges and courtrooms available to try jury cases. In most situations this would not be desirable in terms overall economical operation of the court system.

If, however, the ratio of judge cost to juror cost is low enough, one may be able to improve juror time use and reduce the total cost of court operation by adding an additional judge and slightly reducing the number of jurors called without reducing the number of cases completed. This is discussed in more detail in the simulation section following.

III. SIMULATION OF ALTERNATIVE METHODS OF COURT OPERATION

The above review of possible areas of modification of jury systems points up perhaps more of what we do not know about efficient juror usage than what we do. In general, we do not know the exact amount of increased efficiency achieved by modifying the present system, nor do we know what effect the modification would have on overall court operation. In terms of evaluating the cost and benefits of changes that might improve juror time use and in terms of improving predictions, this presents serious problems. Simply looking at a court system such as the Western District of Missouri does not answer these questions, as one can only see what apparent effect existing procedures are having and there is no way to test modifications. One possibility would be to analyze a large number of different court systems and attempt to examine the effects of different procedure in each. Aside from the expense and difficulty in attempting this, it is difficult to isolate the effect of a single difference between court systems which are different in many ways.

Another possibility would be to experiment with different procedures within one court system. Administrators, however, are naturally reluctant to incur the cost and risk of changing the status quo. The cost

and risk could be avoided if we had a system which behaved as the real court system in all respects, but cost almost nothing to operate. For example, current practice might be to call in 350 jurors into the jury pool. There might be complaints by jurors of too much idle time. The question might then be asked, "Suppose we call in only 250 jurors? Would this significantly reduce juror idle time without reducing the number of cases that can be processed per week?"

One possible solution is to develop a simulation model which is capable of simulating various types of court systems using various types of operating procedures. The effect of changes upon jury time use and total court operation could be realistically assessed. Further the operation of the system could be used as a basis for prediction. This is the motivation for construction of a simulation model of a court system.

The simulation model described here does not simulate the Western District of Missouri but is a model of a larger court with a procedure of maintaining jurors in a ready status at all times in the courthouse, *i.e.*, a pool system. The reason for developing the model in this fashion is that it was felt that this larger jury pool type court system would be the type which presented the most difficult problems of juror use and which would most require use of the computer. The efficient use of jurors in the Western District of Missouri tends to support this assumption. The model has been operated as described below using the data on trial and voir dire lengths obtained from the Kansas City court.

The model consists of a collection of instructions which are executed by a computer. As currently implemented the model requires about 2 seconds of computer time and a cost of about \$.10 to simulate one month's operation of a court system.

The output sheet produced by a typical simulation is reproduced on the following page. The term "parameter" is used to describe a factor which is controllable, for example, the number of people initially called into the jury pool. A more detailed description of the simulator follows.

EXAMPLE OF SIMULATION OUTPUT

COURT PARAMETERS

JURY POOL SIZE 160.

NUMBER OF COURTROOMS 8

NUMBER IN VOIR DIRE 28.

JURY SIZE 12.
 AVERAGE LENGTH OF VOIR DIRE 99.
 AVERAGE TRIAL LENGTH 522.
 MEAN VOIR DIRE LENGTH ()/(MEAN TRIAL
 LENGTH)0.190
 MINUTES PER DAY 360.
 MINUTES DURING WHICH A VOIR DIRE CAN BE
 STARTED 180.
 IDLE JURORS ARE RELEASED AFTER 181
 MINUTES OF THE DAY
 LENGTH OF SIMULATION 9000.

RESULTS

TOTAL JUROR IDLE TIME 156005.
 TOTAL JUDGE IDLE TIME 4725.
 PROPORTION OF JUROR IDLE TIME 0.108
 PROPORTION OF JUDGE IDLE TIME 0.0656
 NUMBER OF CASES TRIED 92.

APPENDIX

TRIAL LENGTH DISTRIBUTION
 250. 845. 1675. 0. 290. 485. 800. 680. 195. 0.
 VOIR DIRE LENGTHS USED
 165. 120. 105. 135. 95. 75. 60. 115. 90. 30.

A. Description of the Court-Jury Simulator

We will describe in some detail a simplified version of the simulator and then point out the additional details included in the actual simulator. The simulator is written in the FORTRAN programming language, which implies that it can be executed on almost any medium-to-large-scale computer.

The following terms are useful in describing any simulator:

Event: A point in time when something important in the system happens, for example, the number of jurors in the jury pool changes.

Events list: A list maintained by the simulator which contains information about what event is scheduled to occur when, for example, a *voir dire* is scheduled to start at 9 a.m.

We assume that the court system being simulated uses a jury pool and in the simplified system we will assume that we are interested only in measuring juror idle time, *i.e.*, time spent in the jury pool, therefore

the only attribute of direct interest is the number of jurors in the jury pool at any point in time.

We will assume that the simplified system is a somewhat ideal system in that it operates continuously. In this system there are only three different types of points in time when the attribute, number-of-jurors-in-the-jury-pool, changes. These events are:

- 1) start of *voir dire*
- 2) end of *voir dire*
- 3) end of trial¹⁵

In the simulator computer program there is a subroutine (set of instructions telling the computer what to do) corresponding to each event which performs the following operations:

- 1) specifies how the system attributes change when this event occurs, e.g., the number left in the jury pool decreases by 28,
- 2) schedules any future events which need to be scheduled onto the events list, e.g., at the end of *voir dire* an end of trial is scheduled,
- 3) collects statistics, e.g., the judge and juror idle time since the last event.

Another routine found in the simulator program is a *clock routine* which keeps track of simulated time.

One feature available on computers which is useful in performing simulations is the ability to make a random draw of a number from any specified collection of numbers. For example, the length of a trial is a random variable. The simulator can be supplied with a collection of numbers which collectively looks like a collection of trial lengths.

The routines contained in the simulator can be paraphrased approximately in English as follows:

Start-*voir-dire* subroutine:

- 1) Calculate juror idle time incurred since last event.
- 2) Take the proper number of jurors out of the jury pool to start a *voir dire*.
- 3) Randomly pick a number from the *voir dire* length collection and schedule an end of *voir dire* accordingly on the events list.
- 4) Return control to the clock routine.

15. Note that we are using a somewhat general definition of *voir dire*. We use the term "*voir dire* length" to denote the entire length of time from when the actual *voir dire* begins until the excess (above those needed for a jury) jurors are released. In the Kansas City system, this usually occurred just before swearing in. Trial length is the time from the end of *voir dire* until the jury is released from the case. This allows the possibility of a settlement before verdict.

End-of-voir-dire subroutine:

- 1) Calculate juror idle time incurred since last event.
- 2) Put unneeded jurors back in the jury pool.
- 3) Randomly pick a number from the trial-length collection and schedule an end-of-trial event accordingly.
- 4) Return control to the clock routine.

End-of-trial subroutine:

- 1) Calculate juror idle time incurred since last event.
- 2) Return the jury to the jury pool.
- 3) If there are no end-of-day effects, schedule a start-*voir-dire* immediately.
- 4) Return control to the clock routine.

Clock routine:

- 1) Advance simulated time until an event is scheduled to occur.
- 2) Remove that event from the events list and cause that event to occur by turning control over to the appropriate event routine.

B. Additional Features Contained in the Actual Simulator

The actual simulation model developed is more complicated than the simplified model described above. The simulator as implemented allows end-of-day effects to be included. As one nears the end of the day it may be desirable not to start a new case. The actual simulator allows one to specify the length of an interval at the end of the day during which no further cases will be started; however, cases already in progress will continue during this interval.

The actual simulator also allows one to specify a time of day at which all idle jurors are released for the rest of the day.

The actual simulator monitors and collects statistics on other attributes in addition to the number of idle jurors and the amount of juror idle time. It counts the number of cases completed in an interval of time and the amount of judge idle time generated by the system.

The simplified simulator assumed that when a *voir dire* was to begin there was always a sufficient number of jurors in the jury pool to start a *voir dire*. The actual simulator allows for the possibility of there being insufficient jurors in the jury pool to start a *voir dire*. If this situation holds when a *voir dire* is otherwise ready to start, judge idle time occurs until there are sufficient jurors to start a *voir dire*. It is assumed that there is always a case ready to be tried.

C. *Modularity in the Simulator*

Because of the modularity of the simulator (that is, each event subroutine is written independently of the other subroutines), it is easy to modify the simulator, add additional details, by simply adding the appropriate routines without modifying the entire simulator program. This can be seen by comparing the simplified simulator and actual simulator.

Other examples of features which might be added to the simulator are:

- a) allow an end-of-week effect, *e.g.*, cases cannot start on Friday.
- b) allow for day-to-day variations in jury pool size due to non-reporting jurors.
- c) allow for the possibility of the non-availability of another case ready to start when a case completes.
- d) allow for variations in size of *voir dire* panels assigned.

D. *Parameterization in the Simulator*

Wherever possible in the simulator program, features are parameterized, that is, adjustable at the time the simulator is run. For example, the jury size is not fixed at 12 but can be easily set to any desired value at the beginning of a simulation run. There are about one dozen such parameters which describe a court system and are read in by the simulator program at the beginning of a simulation run.

E. *Results of Computer Simulations Using the Kansas City Statistics*

The effect of jury pool size and number of judges was analyzed by simulating a court system which used the statistics for *voir dire* length and trial length collected at Kansas City during the accelerated docket starting September 30, 1968. That is, when the simulator needed a trial length, it randomly chose one of the trial lengths observed in the Kansas City court. In the simulations that were run the following assumptions were made:

- 1) A day has 360 useful minutes,
- 2) No *voir dices* are started after 180 minutes of the day have elapsed.
- 3) Idle jurors are released after 181 minutes of the day have elapsed.
- 4) Jury size is 12, and
- 5) *Voir dire* size is 28.

Based on these assumptions a number of simulations were made of court systems for various values of jury pool size and number of judges.

Trial lengths and *voir dire* lengths in these simulations were chosen randomly from the Kansas City statistics. Each simulation was for 9,000 simulated minutes which corresponds to approximately a five week session.

Note that the effect of varying the length of the interval at the end of the day during which *voir dire*s cannot be started was not investigated. We would suspect that increasing the length of this interval, while keeping the jury pool size constant, would decrease the performance of the court system in two ways the first an obvious effect and the second not so obvious:

- 1) Courtrooms will tend to be more idle at the end of the day, thus decreasing capacity.
- 2) Courtrooms will tend to be more idle at the beginning of the day because more *voir dire*s tend to begin at the beginning of the day, so that there is a higher demand for jurors at this time and so more frequently there will be insufficient jurors in the pool to start a *voir dire*.¹⁶

An important measure of court system performance is the number and cost of cases dispatched. This measure for the court system simulated is tabulated in Table 5. The manner in which jury pool size is tabulated in this table is somewhat unusual and warrants explanation. We assume that the jury pool size is sufficient so a jury of size 12 can be sitting for each judge. In practice, *voir dire*s may be in progress in some of the courts so additional jurors must be available to support these *voir dire*s. In our simulations a *voir dire* requires 16 (28 minus 12) more than a jury; so, for example, in an 8 judge system a jury pool size of 144 ($8 \times 12 + 3 \times 16$) is necessary if we wish to allow 3 simultaneous *voir dire*s. Similarly, capability for 4 simultaneous *voir dire*s in a 10 judge system corresponds to $10 \times 12 + 4 \times 16 = 184$ (or also $6 \times 12 + 4 \times 28$) people in the jury pool. This is an obvious way to measure jury pool size since it is the number of *voir dire*s which may be in progress simultaneously which determines whether lack of jurors will cause delay in the courts. We assume that a *voir dire* size of 28 is always sufficient to select a jury.

16. This latter effect has apparently been realized by some administrators and a conscious attempt is made to "stagger" *voir dire*s. If, for example, three cases are ready to start on Monday morning, one may be scheduled to start at 8:30, one at 9:30 and the last at 10:30; then 30 jurors can be asked to come in at 8:30, 15 more at 9:30 and 12 more at 10:30 instead of starting all three cases at 9 which might require 90 people for the three simultaneous *voir dire*s rather than 57 for the three staggered *voir dire*s. If *voir dire*s are allowed to start at any time throughout the day, this staggering tends to occur automatically.

TABLE 5
CASES SETTLED FOR A SIMULATED 5-WEEK SESSION VS. NUMBER OF JUDGES AND JURY POOL SIZE

Number of Simul- taneous <i>Voir Dires</i> Possible	NUMBER OF JUDGES										13	14	15
	8	9	10	11	12	13	14	15	16	17			
3	92	103	120	133	143								
4	92	106	121	137	147	160							
5	93	111	121	137	149	162	176	190					
6	93	111	121	138	151	163	179	193					
7	93	111	124	138	151	164	179	195					
8	93	111	124	138	151	164	179	199					
9		111	124	138	151	164	179	200					
10			124	138	151	164	183	200					
11				138	151	165	183	200					
12					151	165	183	200					
13						165	183	200					
14							183	201					
15								201					

Voir dire size = 28; jury size = 12.

An additional advantage of this form of measuring jury pool size is that the results can also be applied to systems where the jury and/or *voir dire* size are different from 12 and 28 respectively.

The same sequence of trial lengths and *voir dire* lengths were used in all the simulation runs. A random sequence of trial and *voir dire* lengths was chosen first and then this sequence was used for all the simulation runs. Any differences among results for the various court systems simulated are not due to chance. Thus, for example, we can't make statements like: "Court system A completed fewer cases than court system B because the cases it processed just happened to be longer."

F. *Observations and Conclusions on Simulator Results*

In studying Table 5 it appears that there is little to be gained by having a jury pool much larger than that necessary to support half the number of simultaneous *voir dire*s as there are judges. For example, in the 12 judge system, additional jurors do not increase the number of cases completed once there are enough jurors to support 6 simultaneous *voir dire*s. This can be more dramatically shown by examining the costs for judges and jurors.

In Table 6 we tabulate the total judge and juror cost for the five week simulated session described in Table 5. It is assumed that the juror cost is \$22 per day for 25 days (see previous discussion of jurors costs). The judge cost is assumed to be \$176.80 per day.¹⁷ In all the simulated systems except the 15 judge system it is unnecessary to carry a full jury pool (*i.e.*, enough jurors to allow simultaneous *voir dire*s in all courtrooms); that is, for the simulated court systems, there is an upper limit on the jury pool size such that increasing the number of jurors above this limit will not increase the number of cases completed. If we reduce the full jury pool down to this limit we obtain the following reductions in juror costs without reducing the number of cases completed.

For the simulated 15 judge system the jury pool size could be 96 jurors less than a full jury pool for a cost reduction of \$52,800 but this decreases the number of cases disposed of from 201 to 200.¹⁸

17. The total judge salaries paid in the Western District of Missouri for five judges in fiscal year 1968 was \$221,000. It is assumed that there are 250 usable days per year. This figure does not include the cost of supporting services which a judge may need, so the true cost of a judge may be somewhat higher than this.

18. These costs are all based on the assumption that every juror appears every day of the five-week simulated session.

TABLE 6
COST FOR A SIMULATED 5-WEEK SESSION VS. NUMBER OF JUDGES AND JURY POOL SIZE

Number of Simultaneous <i>Voir Dires</i> Possible	NUMBER OF JUDGES										13	14	15
	8	9	10	11	12	13	14	15	16	17			
3	114,560	125,580	136,600	147,620	158,640								
4	123,360	134,380	145,400	156,420	167,440	178,460							
5	132,160	143,180	154,200	165,220	176,240	187,260	198,280	209,300					
6	140,960	151,980	163,000	174,020	185,040	196,060	207,080	218,100					
7	149,760	160,780	171,800	183,820	193,840	204,860	215,880	226,900					
8	158,560	169,580	180,600	192,620	202,640	213,660	224,680	235,700					
9		178,380	189,400	201,420	211,440	222,460	233,480	244,500					
10			198,200	210,220	220,240	231,260	242,280	253,300					
11				219,020	229,040	240,060	251,080	262,100					
12					237,840	248,860	259,880	270,900					
13						257,660	268,680	279,700					
14							277,480	288,500					
15								297,300					

Voir dire size = 28, jury size = 12, juror cost = \$22/day, judge cost = \$176.80/day.

<i>Number of Judges</i>	<i>Possible Cost Reduction</i>
8	\$26,400.00
9	35,200.00
10	26,400.00
11	45,000.00
12	52,800.00
13	17,600.00
14	35,200.00

The figures in Table 6 also indicate that for the court system simulated in, if we are interested in increasing the number of cases tried, it would be cheaper to add another judge rather than to go to a full jury pool. For example, an 8 judge court with 224 jurors (sufficient for 8 simultaneous *voir dire*s) costs \$158,560 and completes 93 trials during the simulation period; whereas a 9 judge court with 156 jurors (sufficient for 3 simultaneous *voir dire*s) costs \$125,580 and completes 103 trials during the simulation period.

In a court system where *voir dire*s are allowed to start later than 180 minutes after the start of the day, fewer jurors than those indicated in Table 5 will be required to achieve the same number of case terminations if all other parameters are the same.

CONCLUSION

From the data gathered we know that the Western District of Missouri makes very efficient use of juror time. The jurors spent 69% of their time in trial activities and only 7% waiting. Jurors in that district did not experience the long periods of useless waiting that some people associate with jury service. The attitudes of the jurors support the conclusion that the court wastes little juror time.

It is also apparent from the operation of the Western District of Missouri that efficiency in juror use is achieved, to some extent, at the cost of trial production. In fourteen trial days, only ten cases were brought to trial and five reached verdict. The four trial judges were in trial only twenty-two days out of a possible fifty-six. The court operates with no ready pool of waiting jurors and uses no staggered *voir dire*s. Cases are begun only in the morning and generally only during the early part of the week. To some extent, cases are scheduled according to the availability of jurors.

This strongly indicates that utilization of jurors can only be considered within the framework of the total operation of the court. In most cases any suggested modifications of court operation that would result in a reduction of juror time used would affect some other element of the court system. There is a tradeoff involved; juror time consumption can be decreased but only with a resulting cost elsewhere.

This also suggests that the apparently increasing complaints of inefficiency in juror use may be symptomatic of increasing caseloads and pressures to bring cases to trial that face many courts. To achieve a high level of trial production, these courts must sacrifice juror time.

There really are no dramatic modifications in court operation that should or could be made to improve juror utilization. Efficient use of jurors could be drastically improved only by changing the basic trial system. Improving juror use within the present trial system will require a number of small, carefully planned changes in court administrative practices.

With the limited amount of data presently available, we can only suggest that the area of greatest interest for realistic improvement of juror use is that of administrative management and planning by the court. The key modification may be improved techniques in planning supply and demand of jurors.

The proper way to proceed is to identify specific modifications in the court system which reduce the amount of juror time used, assess the cost of this change and compare the cost with the benefits resulting from the change.

In many areas precisely identifying and measuring costs and benefits will be extremely difficult. It is suggested that one technique that may prove extremely useful is to develop a simulation model of the court system. The simulation model will allow us to inexpensively examine the effect of changes in the court system and experiment with possible modifications without disruption of normal court operation. The discussion of the simulation model above provides a general example of how we might examine alternative methods of court operation.

Finally, this study indicates that extreme problems of waste of jury time are probably more common among large metropolitan court systems. It is this type of court that is under the most pressure to get cases tried and which must maintain a pool of waiting jurors to do so. What must be done is to make a careful examination of this type of court and using simulation models and other appropriate techniques, evaluate possible changes in terms of effects on court operation and efficiency of jury use. It is hoped that the present study will provide a basis for a full scale research effort in a large court system.

