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Judicial Decision Making and Computers

Allen Harris

JUDICIAL DECISION MAKING AND COMPUTERS

ALLEN HARRIS†

I. INTRODUCTION

IT HAS been said: "The Second Industrial Revolution is here. Its principal cornerstones are automation and computers. The Second Industrial Revolution will create new problems for lawyers. It will also bring about many changes in the law, the practice of law, and the administration of justice."[1] Some examples from the courtroom, the courthouse and the legislature will serve to illustrate how this revolution already is affecting "the law, the practice of law, and the administration of justice":

The courtroom: In 1952 prosecuting authorities in a California federal bribery case used a computer to make a statistical analysis of data;[2] and in 1963 a Cleveland, Ohio attorney in a medical malpractice case utilized a computer to prepare questions for his cross-examination of a witness.[3]

The courthouse: The probate court for St. Louis County, Missouri was the first probate court to use punched cards for the preparation of court minutes and other statutory records.[4] The Superior Court of Los Angeles County, as a consequence of a study undertaken by the U.C.L.A. Committee for Interdisciplinary Studies of the Law and the Administration of Justice in association with the Systems Development Corporation,[5] has made use of automated equipment in several different ways: to enable marriage counsellors in the Conciliation Court to gain more meaningful, immediate and material access to the data that they collect;[6] to enable the jury division to operate more efficiently in the selection of jurors;[7] and to enable the clerks to keep more useful records concerning criminal matters.[8]

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† Associate Director, Institute of Judicial Administration, New York University. B.A., New York University, 1949; LL.B., Columbia University, 1954.

1. Lawlor, *Forum: Computers and Automation in Law,* 40 CAL. B.J. 30 (1965).
2. Hayden, *How Electronic Computers Work: A Lawyer Looks Inside the New Machines,* 62M MODERN USES OF LOGIC IN LAW 112, 117–18 [Hereinafter, M.U.L.L.]; Lawlor, *Counter-Example,* 64J M.U.L.L. 34.
3. Morris, *Hospital Computers in Court,* 63J M.U.L.L. 61.
4. Hensley, *Punched Cards Produce Progress in Probate Court,* 48 A.B.A.J. 138 (1962).
5. *System Development Corporation's Studies in Legal Data Processing,* 62D M.U.L.L. 238, 239.
6. Adams, *EDP Aid to the Courts,* in PROCEEDINGS OF THE CONFERENCE ON EDP SYSTEMS FOR STATE AND LOCAL GOVERNMENTS 18 (1964).
7. *Id.* at 19.
8. *Ibid.*

The Court of Common Pleas of Allegheny County, Pennsylvania, of which Pittsburgh is the center, uses data processing procedures and equipment to provide court personnel with the information that they need to keep up to date with calendars that bulge with personal injury cases.[9] An experimental program to determine the feasibility of applying modern data processing methods to the collection and analysis of court statistics is under way in the Superior Court located in Suffolk, Massachusetts.[10] The Judicial Conference of the State of New York, in order to make sentencing institutes that are held for judges more meaningful,[11] is thinking about using a computer to evaluate statewide sentencing practices.[12] An IBM "System/360," now in operation in the Criminal Court of the City of New York, is expected to aid substantially that court's Traffic Summons Control Bureau in the performance of its duty.[13] The Council of State Governments issued a recent report which stated that twelve court systems situated in the United States and Puerto Rico are using automatic data processing equipment to perform such administrative tasks as calendar control and maintenance of statistics of case disposition.[14]

The legislature: Professor John Horty, Director of the Health Law Center at the University of Pittsburgh, has encoded and stored on magnetic tape, available for research by computer, the complete laws of the United States, the New York and Pennsylvania statutes, the health statutes of eleven other states, the Pennsylvania Attorney General's opinions dealing with education, the New Jersey Constitution, court rules and rules of evidence.[15] Also included are the general ordinances of the City of Pittsburgh from 1816-1963,[16] the municipal ordinances of Middletown, New Jersey, the administrative rules and regulations of the Department of Education and of the State of New York, the administrative opinions and decisions of the Comptroller General of the United States, and the enacted legislation of all fifty states for 1963-1964.[17]

9. Ellenbogen, *Automation in the Courts,* 50 A.B.A.J. 655 (1964).

10. Spangenberg & Neumann, *Data Processing: A Modern Tool to Help Improve Judicial Administration,* 50 MASS. L.Q. 31, 34-35 (1965).

11. N.Y. JUD. LAW § 234-a (Supp. 1965).

12. Interview with Lawrence N. Marcus, Counsel to the Judicial Conference of New York State, March 3, 1966.

13. Interview with T. R. O'Connell, Account Manager-Government of the IBM Data Processing Division, March 8, 1966.

14. COUNCIL OF STATE GOVTS., AUTOMATIC DATA PROCESSING IN THE COURTS (1965).

15. Davis, *Automatic Data Processing and the Judge Advocate General's Corps,* 23 MILITARY L. REV. 117, 129 (1964).

16. Springer, *Application of Information Retrieval Techniques: Preparation of the Ordinances of Pittsburgh,* 26 U. PITT. L. REV. 551, 552 (1965).

17. *Law School Research Projects Reported,* 65S M.U.L.L. 117, 122.

Recently the legal research foundation at the University of Pittsburgh took over from the American Bar Foundation the publication entitled *Current State Legislation,* which is a service that provides a quick indexed reference to the legislation of all fifty states by means of a "7010" computer.[18] Section 3002 of the California Corporation Code, enacted in 1963, permits corporations to maintain certain records on electronic data processing equipment such as magnetic tape.[19]

The instant paper will discuss judicial decision making and computers. This will be done by first discussing the work being done to improve the accessibility of judicial decisions to the Bench and Bar, and then by discussing the work being done to determine how judicial decisions are actually made.

II. THE WORK BEING DONE TO IMPROVE THE ACCESSIBILITY OF JUDICIAL DECISIONS TO THE BENCH AND THE BAR

Before reviewing the many computer-oriented projects that are endeavoring to more efficiently provide judges and lawyers with access to court decisions, a few words must be said about the almost unbelievable accumulation of American case law[20] and the difficulties that it has engendered in the area of information retrieval.

In 1962 there were approximately 2¼ million decisions of courts of record crowded together on shelves in the law libraries of this country.[21] A significant fact about this staggering number of cases is that its rate of growth has been steadily accelerating. Professor F. Reed Dickerson reports: "From 1658 to 1879, a period of 221 years, the reported American cases numbered about 407,000. From 1879 to 1932, a period of fifty-three years, they numbered about 1,121,000."[22] Professor Vincent Fiordalisi, Law Librarian at Rutgers University, estimates that this inventory annually increases by 25,000 new opinions.[23]

Not only has there been a tremendous expansion in written case law, but also there has been just as rapid an expansion in the other

18. *Current State Legislation Moves to Pittsburgh,* 65M M.U.L.L. 33; see Note, *American Bar Foundation is Publishing Unique Index to Current State Legislation,* 50 A.B.A.J. 231 (1964).

19. Lawlor, *Corporations Code of the State of California,* 64J M.U.L.L. 33–34.

20. ALLEN, BROOKS & JAMES, AUTOMATIC RETRIEVAL OF LEGAL LITERATURE: WHY AND HOW (1962). This very worthwhile monograph traces the growth in American case law from 1792 to 1958 and also traces the growth in other American legal literature such as statutes and periodicals.

21. Lawlor, *Computers and the Law,* 35 N.Y.S.B.J. 135, 137 (1963).

22. Dickerson, *Electronic Computers and the Practical Lawyer,* 14 J. LEGAL ED. 485, 486 (1962).

23. FIORDALISI, *Panel Discussion,* in ABA ELECTRONIC DATA RETRIEVAL COMMITTEE, APPLICATIONS OF ELECTRONIC DATA PROCESSING SYSTEMS TO LEGAL RESEARCH 23 (1960).

chief components of legal literature such as treatises, periodicals, digests, statutes, administrative regulations and opinions. The Library of Congress contains nearly a million volumes on the subject of law,[24] and there are more than 1½ million statutory sections on file,[25] to which annually are added 29,000 new statutes.[26] Leaders of the Bench and Bar from time immemorial have lamented this multiplication of legal source materials.[27] The time has long since passed when a judge could profitably require his clerk, as Judge Brandeis is reported to have done,[28] to search every page of all of the decisions of the United States Supreme Court in order to locate each statement that had ever been uttered in connection with a particular subject, or, similarly, when a law firm[29] could profitably require their clerk to read all existing cases on a certain subject in order to insure that everything of relevance was included in the firm's brief. Judges and lawyers might be able to hold their heads above water in the ever-deepening sea of legal documents if the available research tools were equal to the task of retrieving all of the pertinent materials. Unfortunately for the legal community, they are not.

Mr. Vincent P. Biunno, a member of the American Bar Association Committee on Electronic Data Retrieval, put it very succinctly when he said: "There is a strong suspicion that the mountain of precedents has grown to such size that legal research ordinarily consists of no more than snatching the first bit of relevant material that can be found and then flying by the seat of the pants."[30] Even though the mechanism of the law's research system is creaking badly under the weight of the documents it must classify, it is still one of the most complex and effective indexing and retrieval systems available to any profession.[31] However, if this system is to continue to furnish any worthwhile assistance to the legal community, it must be improved.

A primary cause of the crisis in legal research has been a breakdown in the digest system. Digests, which are compilations of case headnotes arranged into elaborate pigeonholes by analysts employed by private publishers, are virtually the only systematic way through

24. Brown, *Electronic Brains and the Legal Mind: Computing the Data Computer's Collision with Law,* 71 YALE L.J. 239, 251 (1961).
25. Wilson, *Computer Retrieval of Case Law,* 16 SW. L.J. 409 (1962).
26. FIORDALISI, *op. cit. supra* note 23, at 24.
27. Swayze, *Can We Improve The Sources of Our Law,* in N.Y.C.B.A., VOL. III LECTURES ON LEGAL TOPICS 145–46 (1921).
28. Lawlor, *supra* note 21, at 140.
29. JONES, LAW AND ELECTRONICS: THE CHALLENGE OF A NEW ERA 27 (1962).
30. Extract from an address by Mr. Vincent P. Biunno entitled *Progress and New Developments in Electronic Research for the Lawyer,* presented at the 1959 annual meeting of the A.B.A., quoted in Davis, *supra* note 15, at 124. See also Fratcher, *The Decline of the Index to Legal Periodicals,* 18 J. LEGAL ED. 297 (1966).
31. Marke, *Progress Report on Project Lawsearch,* 58 L. LIBRARY J. 18, 19 (1965).

which a lawyer doing research can get into a body of case law.[32] The digests have been brought to their knees, however, because of the inherent inflexibility of their hierarchical systems of classification. Professor Joan Covey, Librarian at the Dickinson School of Law, has written that: "very few imaginative indexing techniques have been forthcoming from commercial publishers in the past forty years. . . . It is difficult to evaluate the reasons for this failure by the profession to make heavier demands upon book publishers."[33] An official of the West Publishing Company, the company which in 1879 initiated the first key number system, is quoted as having said in 1963 "that if they were setting up the key number system today they would have a different arrangement."[34] A lawyer learns at first hand the inflexibility and lack of response to change of this system when he tries to use it to find the law on subjects such as conflicts of law, administrative law or antitrust law.[35]

An excellent example of the hierarchical method of classification in action with all of its attendant ills is provided by a brief analysis of the West Publishing Company's Reporter Series, which contains the written opinions of the federal and state appellate courts. Each opinion is classified into one or more of approximately 80,000 categories (or "key numbers") by an analyst who reads the case and decides into which of the West list of categories the case fits.[36] Reference should be made in this connection to the following statement of Professor Robert A. Wilson, who was for a long time associated with the Southwestern Legal Foundation:

> It must be remembered that the change of a major topic in a hierarchical index is not a matter of merely changing words, for many times the changes have repercussions down through a string of regional and state digests. It also requires a wholesale reorganization of the subtopics, not only within the major topic, but in the material left under the old topic.
>
> Two other inherent characteristics of a hierarchical indexing system affect the research process adversely. First, the fact that each new decision must be boiled down to fit into a predetermined pigeonhole requires the digester either to leave out those portions of the case for which no pigeonhole exists, or to squeeze them, willy-nilly, into a preconceived mould. In either case serious

32. JONES, *op. cit. supra* note 29, at 30.
33. Covey, *Information Retrieval in Law: Problems and Progress with Legal Computers*, 67 DICK. L. REV. 353, 355 (1963).
34. Wiener, *Panel Discussion, "The Computer in Law, Yes or No?,"* 64S M.U.L.L. 93, 100.
35. Loevinger, *Panel Discussion, "The Computer in Law, Yes or No?,"* 64S M.U.L.L. 93, 95.
36. Paper delivered by Professor Layman E. Allen to the Congress of the International Federation for Documentation, in Washington, D.C., October 10–15, 1965, at 3.

> distortions may result. Second, there are very practical limitations on the size of the index volumes before they become unwieldy and on the size of the type before it becomes unreadable.[37]

In addition to the barrier of the hierarchical index, our current arsenal of research tools presents other barriers to effective law searches. Colonel Davis, of the United States Army Judge Advocate General's Corps, lists these barriers in this way:

> Different indexing systems are used for separate digests or compilations, requiring the researcher to adjust his terms of reference as his search takes him from one source to another. And if he does not think in the same terms as the indexer or classifier, a formidable barrier exists between him and the basic material. Further complicating the lawyer's research efforts is the fact in most conventional index-digests the headnotes state only the legal principles involved in the case. The factual background which makes the case relevant to a particular problem is usually omitted.[38]

Even citators, which some authorities consider the ultimate in manual retrieval tools,[39] have defects:

> A court may decide a case involving the same principle of law as an earlier one without mentioning the earlier case, and the connection is thereby lost. Another failure of the system is that you may have a string of citations a page long of cases consistently applying the same rule of law. But last week the legislature passed a statute that said now it was to be different, and that statute is not on the list of citations.[40]

Larger and larger segments of the legal community have abandoned hope that the existing methods of legal research can ever be improved enough to perform the tasks imposed upon them.[41]

As a result of the loss of confidence in traditional manual search techniques, a few adventurous members of the legal profession have made the suggestion that it might prove fruitful to apply the principles of modern scientific technology to the solution of this problem. The word "jurimetrics" was first[42] used by Judge Lee Loevinger of Minnesota in 1949 to signify the scientific investigation of legal problems.[43] Since the time of its origin the influence of jurimetrics has spread

37. Wilson, *supra* note 25, at 411–12.
38. Davis, *supra* note 15, at 123.
39. Covey, *supra* note 33, at 355.
40. JONES, *op. cit. supra* note 29, at 40.
41. Dickerson, *supra* note 22, at 494.
42. Baade, *"Forward" to Jurimetrics Symposium,* 28 LAW & CONTEMP. PROB. 1 (1963).
43. Loevinger, *Jurimetrics: The Next Step Forward,* 33 MINN. L. REV. 455, 483 (1949).

throughout the United States.[44] Late in 1960 the Association of American Law Schools created a jurimetrics committee,[45] which sponsored a nationwide conference on jurimetrics in September 1963 at Yale University.[46] The purpose of the conference was to help the committee formulate recommendations "for the consideration of the Association of American Law Schools concerning curricular and research activity within the areas of the Committee's interests."[47] During the period of its existence the Committee:

> [H]as been concerned with the need for study and research in the legal aspects and implications of various developments (1) in information processing technology (including the use of computers and other devices for the purpose of information retrieval and analysis), (2) in quantitative analysis of social processes, (3) in theories of learning, problem solving, and decision making (including competitive gaming and programmed instruction), and (4) in the use of such tools of analysis as symbolic logic, statistics, probability theory, and structural linguistics in the investigation of legal language and the analysis of legal problems.[48]

The chairman of the Committee is Professor Vaughn C. Ball of the University of Southern California.[49]

The ingredients that make up jurimetrics are digital computers and modern logic.[50] Mr. Paul S. Hoffman, former Chairman of the Techno-Legal Committee of the American Law Student Association, explains the operation of digital computers in this fashion:

> Computers may be either digital or analog. The speedometer of an automobile is essentially an analog computer. One converts the motion of the needle into a digital reading in miles per hour by reading the dial. The common Marchant and Friden desk calculators are digital computers although mechanical in nature. An electronic digital computer is basically no more sophisticated although it substitutes electronics for machinery and possesses a larger memory. Electronic digital computers may be classed as small, medium, and large scale. . . .

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44. Duke University devoted the Winter, 1963 issue of its publication, *Law and Contemporary Problems,* to a symposium on Jurimetrics. 28 LAW & CONTEMP. PROB. 1–270 (1963). Interest in jurimetrics has not been restricted to the United States; a recent foreign article on the subject is: Meyer, *Jurimetrics: The Scientific Method in Legal Research,* 44 CANADIAN B. REV. 1 (1966).

45. Johnson, *Jurimetrics and the Association of American Law Schools,* 14 J. LEGAL ED. 385–86 (1962).

46. ALLEN & CALDWELL, COMMUNICATION SCIENCES AND LAW: REFLECTIONS FROM THE JURIMETRICS CONFERENCE XIII–XIV (1965).

47. *Id.* at XIV.

48. *Ibid.*

49. AMERICAN ASS'N OF LAW SCHOOLS, PROGRAM AND COMMITTEE MEMBERSHIPS 42 (1965).

50. Kayton, *Can Jurimetrics Be of Value to Jurisprudence?,* 33 GEO. WASH. L. REV. 287, 289 (1964).

> The basis for computer operation is furnished by a series of simple instructions called a "program", which is stored in the computer memory. Computers are merely inert conglomerations of electronic hardware until told to execute a program.
>
> Computers can remember information. The information may consist of program instructions, numbers, letters of the alphabet or special characters. Computer memories come in many forms ranging from magnetic tape, disc, drum, or core to punched paper tape, thin film, and various types of delay lines. Memories can be expanded in capacity to almost unlimited size. . . .
>
> Computers have the ability to compare two pieces of information and determine whether or not they are precisely alike. This capability allows retrieval of specific information from the computer memory.
>
> A computer's communication with the outside world is accomplished by means of input and output devices which are generally, although not always, mechanical in nature. Input devices may include typewriters, punched card readers, punched paper tape readers, and of course, the proverbial push buttons. Output devices may include typewriters, high speed line-at-a-time printers, card punches, and visual displays on television–type receivers.[51]

If computers can be successfully harnessed for the law's purposes, a day may soon dawn when:

> Provided all relevant documents have been stored, the lawyer need go to only one source for his research. All materials of interest can be searched simultaneously, rather than through a series of indices and digests. The lawyer need be familiar with only one indexing or search system. Searches can be made much faster, relieving the lawyer of much drudgery and non-professional activity. A wider range of materials can be examined for pertinancy and no materials will be overlooked, resulting in a better quality of professional work. Automation also can provide an opportunity to retrieve cases according to their fact similarities, as well as on the similarities of their legal issues.[52]

A major advantage of computer-oriented research over most traditional manual research methods is that the computer is not bound by the hierarchical index system. The computer has the capability of searching for terms in combination. Thus if a search question includes five terms such as "Taxation," "Department of Revenue," "Reports," "Transportation Companies" and "Using Highways for Gross Receipts Tax," the computer would match the references following each

51. Hoffman, *Lawtomation in Legal Research: Some Indexing Problems,* 63M M.U.L.L. 16, 17.
52. Davis, *supra* note 15, at 123.

term to discover the particular reference indexed under all five terms.[53] In the words of computer technology:

> Actually the hardware — the mechanical devices — for permitting . . . [the] handling of legal data is already in existence. What is lacking is an adequate means of coding, indexing and retrieving the data that are to be handled. The softwear — the design of systems for utilizing the hardware — is what is now required. This involves an understanding of the intellectual instruments of science that have been referred to, plus an ability to employ these tools and improvise applications.[54]

The computer can do anything we tell it to do; its only limitation is our ability to provide it with instructions.[55]

A major roadblock to developing workable computer programs is found in the language of the law. The law basically uses natural language,[56] whose chief characteristics are lack of precision and ambiguity.[57] For example, there is the synonym problem, which is partially met by the individual lawyer's ingenuity and vocabulary. If he searches for authorities under the word "tax" and finds no entry he may then try the word "taxes," and if he still does not find any entry he may then turn to the word "taxation." Such repeated questioning used with the computer would be too costly as well as too time consuming. Of course the lawyer could phrase a question to the computer which would include all the synonyms in alternative form, but this would similarly waste a lot of time.[58]

One answer to the language problem is to develop a standardized legal vocabulary.[59] In 1960 the Committee on Mechanized Searching for the American Patent Law Association and the Patent Office formed a joint committee to study "the problems of standardization of electronics language in the use of patents."[60] However, if a standardized vocabulary is ever to receive widespread use by the legal profession it must prove that it contains within it "the richness of legal thought, the systematic ambiguity of critical legal concepts, and the normative aspects of legal standards and principles."[61]

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53. Hoffman, *supra* note 51, at 19–20.
54. Loevinger, *Jurimetrics: Science and Prediction in the Field of Law,* 46 MINN. L. REV. 255, 271 (1961).
55. Loevinger, *Jurimetrics: The Methodology of Legal Inquiry,* 28 LAW & CONTEMP. PROB. 5, 32 (1963).
56. JONES, *op. cit. supra* note 29, at 78.
57. Stover, *Technology and Law — A Look Ahead,* 63M M.U.L.L. 1, 4.
58. Hoffman, *supra* note 51, at 18; Wilson, *supra* note 25, at 429–31. The problem that homonyms, implied equivalencies, and ambiguities present to the computer are discussed in Dickerson, *supra* note 22, at 489–91.
59. Dickerson, *Some Jurisprudential Implications of Electronic Data Processing,* 28 LAW & CONTEMP. PROB. 53, 66 (1963).
60. JONES, *op. cit. supra* note 29, at 110.
61. Stover, *supra* note 57, at 4.

Another answer to the language problem is for judges and lawyers to use more logically consistent terminology.[62] If the legal profession did this it would be making use of a fundamental characteristic of the computer. The computer is a logic machine[63] and it requires "logical and consistent kinds of language" for its efficient operation.[64] Professor Layman Allen of Yale Law School has been a vigorous exponent[65] of the use of symbolic logic in the drafting of legal documents so that their analysis can be performed automatically.[66] Since 1958 Yale Law School has offered a course in Symbolic Logic and Legal Communication.[67] Work in the application of logic to legal science has not been confined to the United States. Albert Menne of Hamburg University has written on the subject;[68] in 1962 the faculty of law at the University of Sydney, Australia offered a juristic logic course;[69] and Poland, since the end of the second World War, has required all of its law students to take a symbolic logic course.[70] Professor Allen and Miss Caldwell, his collaborator, claim that "the use of modern logic in law is seen as a liberating tool, not a confining one; as a means of clarifying issues, not furnishing criteria for resolving them; as an aid for helping to communicate concisely and precisely when that is the goal that the communicator seeks."[71] However, Carl Stover, a political scientist, warns:

> If the computer becomes the jurist's "Shepard", will it also become his lord? A strong case can be made for the possibility. Where technology of any kind is used, it teaches the user its ideas and methods. In the case of advanced electronic systems, the lessons are very powerful. More than once it has been suggested that to use a computer, you must learn to "think" like one. It is necessary to "see" the world as the computer "sees" it. Although there is no doubt that computers will come increasingly

62. Baade, *supra* note 42, at 2.
63. Cowan, *Decision Theory in Law, Science and Technology,* 17 RUTGERS L. REV. 499, 511 (1963).
64. Stover, *supra* note 57, at 4.
65. Brown, *supra* note 24, at 245 n.11.
66. Professor Allen has written prodigiously about symbolic logic and its application to the law. He also has logically analyzed various legal documents such as the test ban treaty, sections of the federal estate tax statute, and sections of the Internal Revenue Code to point out their ambiguities. A few examples of his work follow: Allen, *Beyond Document Retrieval Toward Information Retrieval,* 47 MINN. L. REV. 713 (1963); Allen & Caldwell, *Modern Logic and Judicial Decision Making: A Sketch of One View,* 28 LAW & CONTEMP. PROB. 213 (1963); Allen, *Automation: Substitute and Supplement in Legal Practice,* 7 Am. Behavioral Scientist 39 (Dec. 1963); ALLEN & CALDWELL, *op. cit. supra* note 46; Allen, *supra* note 36.
67. JONES, *op. cit. supra* note 29, at 152.
68. Menne, *Possibilities for the Application of Logic in Legal Science,* 64D M.U.L.L. 135.
69. *Juristic Logic Course for Sydney, Australia,* 62M M.U.L.L. 41.
70. JONES, *op. cit. supra* note 29, at 151–52.
71. Allen & Caldwell, *Modern Logic and Judicial Decision Making: A Sketch of One View,* 28 LAW & CONTEMP. PROB. 213, 269 (1963).

> close to their natural goal of "seeing" and "thinking" like men, there is a rather wide gap at present, and at least some are convinced that there will always be a significant one.
>
> But is it important? In permitting the technical reason of the computer to invade the realm of law, are we giving up anything vital? Are legal reason and technical reason the same?
>
> Or are we gaining too much of the wrong thing? It is a mistake to seek more precision in a class of things than the nature of the subject admits. To do so confounds reason and converts the subject into something else. Is the nature of law such that it can be subjected to the precise formulations of mathematical logic without distortion?[72]

Over forty years ago Oliver Wendell Holmes, in a United States Supreme Court decision, said "a page of history is worth a volume of logic."[73]

The experimentation in the field of automated legal research has principally followed two main avenues: the first, automated searching of material which has been manually indexed or abstracted prior to entry into the computer; and the second, automated searching of the full natural text of source material which has not been indexed prior to entry into the computer.[74] Experiments in the manual abstraction of material before its entry into the computer have come under attack.[75] This attack has been based on the fact that "automated systems of legal research which rely on prior abstracting or indexing of documents seem to perpetuate, in many respects, the difficulties and shortcomings inherent in our present methods of organizing and storing legal reference material."[76] Today a lawyer is subject to frustration in his "legal research if the abstractor lacks skill, insight or imagination."[77] John Horty has said, "all I can say again is, if I can possibly avoid it, I don't want a human to do any indexing. . . ."[78]

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72. Stover, *supra* note 57, at 5.
73. New York Trust Co. v. Eisner, 256 U.S. 345, 349 (1921).
74. Davis, *Automatic Data Processing and the Judge Advocate General's Corps,* 23 MILITARY L. REV. 117, 125 (1964).
75. Eldridge & Dennis, *The Computer As A Tool for Legal Research,* 28 LAW & CONTEMP. PROB. 78, 86 (1963).
76. Davis, *supra* note 74, at 131.
77. Loevinger, *Science and Legal Thinking,* 25 FED. B.J. 153, 164 (1965); see in this connection JONES, *op. cit. supra* note 29, at 146, where it is said:

> [T]hese headnotes are produced by the private publisher of the National Reporter System. . . . If you contemplate the nature and magnitude of the task involved in the production of those headnotes, you will quickly realize that, of all the tasks to which one might turn in the legal profession, this is surely, comparatively, menial drudgery. It is not invidious of these persons to observe that these headnotes are written by the less able or the less experienced lawyers in the whole legal profession. In other words, the research "key" which must be turned by the lawyer to open his way into the law of his problem is made by men and women who for one reason or another are at one of the lower rungs of psychic or financial income on our professional ladder.

78. JONES, *op. cit. supra* note 29, at 118.

Automated searching of the full natural text of source material that has not been indexed prior to entry into the computer requires much more complicated computer programs and much more computer time than the manual abstract method just described. The researcher in this case must determine the language or words that would probably be used in documents which pertain to his problem. Even though a high level of talent is not required to prepare the research documents, much time is required to enter the full text of reference material into the computer.[79]

At this point we will take a look in detail at some of the leading projects that are under way to make automatic retrieval of legal information a reality.

A. Point of Law Approach

One of the earliest projects was the "point of law" approach originated in 1957 at Oklahoma State University by the late Professor Robert T. Morgan.[80] This approach may be "characterized as an automated and vastly accelerated West Key Number type system."[81] Professor Morgan described the operation of his system in these words:

> "A Point of Law Approach", in essence, involves the analysis of each case for the particular pertinent issues that are actually decided in that decision, dicta, or other material. When a particular point has been determined it is then given a code number. By "code number" we mean that a word, a phrase or a paragraph which represents a legal concept can then be reduced to a single bit [a bit represents a word, phrase, paragraph, or whatever is needed to establish a concept] of information, so far as the computer is concerned. This, we believe, is perhaps the most significant feature of this system. We are dealing with concepts rather than with words.[82]

The three chief features of difference of the "point of law" approach from conventional manual methods are: (1) it is capable of searching for numerous "concepts" at the same time among reported decisions; (2) all of the law is searched in answer to each question so that when no response is received one can be fairly certain that no precedent exists for that particular question; and (3) the researcher is able to select the type of machine output he desires in answer to his

79. Davis, *supra* note 74, at 131.

80. *Jurimetrics: The Electronic Digital Computer and Its Application in Legal Research,* 50 IOWA L. REV. 1114, 1126 (1965).

81. Eldridge & Dennis, *supra* note 75, at 86.

82. Morgan, *"The Point of Law" Approach,* 62M M.U.L.L. 44, 45.

question such as "citations alone," or "citations plus headnotes," or "citations plus headnotes plus full text" or "citations plus headnotes plus full text plus all of the pertinent codes and regulations that may pertain to this particular concept."[83] This tool allows a researcher to directly approach in his search for answers the whole storehouse of information if he is conversant with the indexing procedure.[84]

In 1961, at the annual meeting of the American Bar Association, Professor Morgan gave a demonstration of his system. On this occasion he searched the Internal Revenue Code, the regulations of the Internal Revenue Service, and selected cases in the Federal Gift Tax Field on an IBM "1401" computer.[85] However, a few of the apparent disadvantages of this approach are: (1) the initial analysis is expensive because of the number of persons needed to analyze the mass of material; (2) just as in the present digest system, it is difficult to insure uniformity in the method of treatment, or in accuracy, or in depth of detail; and (3) the document file can only be updated and reorganized by complete removal, re-analysis and then reintroduction under new code numbers.[86]

B. Concept of Decision Approach

The Federal Trade Commission has developed a law and fact retrieval system for the computer which utilizes a "concept of decision" approach. This system retrieves citations. It operates this way:

> On the law side Commission, Circuit Court, and Supreme Court cases are briefed into their main Concepts of Decision. The Concepts are stated in short, complete, sometimes ungrammatical sentences beginning with a word of art or other technical term for purpose of alphabetizing. Each Concept is given a number and followed by citations to decisions in which it is the law of the case. All are coded and punched on cards. The searcher analyzes the facts of his case-in-hand and requests the law by Concept Number. Machines search out the numbers and print out the citations.
>
> On the fact side, each Commodity is numbered and followed by citations to cases ruling or violations involving that Commodity both by the Commission and on appeal. Though each factual situation is unique, experience shows that like Commodities give rise to like violations. The searcher can turn up cases with facts very similar to his case-in-hand by requesting a machine search of Commodity Numbers.

83. *Id.* at 46.
84. Eldridge & Dennis, *supra* note 75, at 86.
85. *Minutes of the Annual Meeting of the Special Committee on Electronic Data Retrieval of the American Bar Association*, August 8, 1962, 62D M.U.L.L. 267, 268.
86. Eldridge & Dennis, *supra* note 75, at 86.

> In addition to law and fact (derived from decisions), non-case material may be merged into the system. This matter includes law review articles, statutory histories, internal research papers, books and phone numbers of subject matter experts.[87]

C. Descriptor System Approach

Mr. John C. Lyons, of George Washington University, developed the "descriptor system" approach. This is a more sophisticated prior manual indexing system than the "point of law" system.[88] Mr. Lyons describes his system in these terms:

> The project at George Washington University is a joint project between the George Washington Graduate School of Public Law and the Datatrol Corporation. This project is a document retrieval system. Special emphasis is placed upon the search technique. It is a pilot plan operation which contains 350 documents including Antitrust Decisions, FTC Decisions, Legal periodicals and legislative history. The indexing system is a descriptor system. Each descriptor, at least in theory, represents a single thought. Fact patterns, point of law, commodities, acts, dates, and even Supreme Court Justices are used as index terms. Since the system uses a 1401 computer, having a core memory, the desirability of having a hierarchic index is substantially lessened. Under this system each user selects his own terminology and also his own hierarchic structure which is called level of inquiry. The product of such a request is a full citation plus a list of the descriptor terms and a short abstract, with a relevancy number. The higher the number, the more relevant your document is to the search request. The system also has the flexibility of searching by analogy through the use of an association factor.[89]

This system permits immediate access to key points of the case and is indexed "at great depth, something to the order of 5 to 10 times as deep as the West indexing system."[90] Thus the researcher is able to be very precise about the type of information he desires retrieved, in contrast to the "point of law" approach, "in which only purely legal concepts are considered and other identifying features of a source such as date, jurisdiction, fact patterns, judge, and parties involved are ignored."[91] John Lyons believes that the descriptor system has worked effectively "in the field of Federal public law where most court and agency decisions are lengthy."[92]

87. *Law/Fact Retrieval at F.T.C.*, 63M M.U.L.L. 43.
88. *Jurimetrics: The Electronic Digital Computer and Its Application in Legal Research, supra* note 80, at 1127–28.
89. Lyons, *New Frontiers of the Legal Technique*, 62D M.U.L.L. 256, 262.
90. *Id.* at 260.
91. *Jurimetrics: The Electronic Digital Computer and Its Application in Legal Research, supra* note 80, at 1128.
92. Lyons, *supra* note 89, at 260.

D. LEX

In addition to his work at George Washington University, Mr. Lyons has helped develop a "manually indexed, machine processed, legal research system . . . for the Antitrust Division of the Department of Justice."[93] It is claimed that this is the "first automated legal research system in operation in the Federal Government."[94]

> This legal index system is called LEX. It provides several different means of locating legal material related to antitrust law through a mechanized system of references and abstracts. The index is in four parts which are as follows:
>
> Part 1 — Court decisions
>
> Part 2 — Material originating in the Antitrust Division
>
> Part 3 — Legislative history
>
> Part 4 — Legal periodical material
>
> . . . . The material contained in all four parts of LEX is in such form that it can be mechanically arranged by punch card machines and electronic computers. Therefore, changes in format can be readily made.
>
> This indexing system is constructed in such a fashion that it can and will be readily and frequently supplemented. The method of construction also permits ready rearrangement of the materials and classifications. Index sections may be added or omitted as experience indicates.[95]

The full text of the documents indexed and abstracted is maintained on microfilm for permanent storage.[96]

E. Semantic Coded Abstract Approach

The Center for Documentation and Communications Research located at Western Reserve University created a very complex system of manual indexing for the automated retrieval of legal information called the "semantic coded abstract" approach. In this approach "information is abstracted from the documents to be indexed and is translated into an artificial language."[97]

> Underlying this system are two assumptions: First, that in scientific writing all the words contained in the average piece of

93. Lyons, *Automation and the Administrative Process,* 64M M.U.L.L. 37, 41.
94. *Ibid.*
95. *Id.* at 41–42.
96. *Id.* at 42.
97. *Jurimetrics: The Electronic Digital Computer and Its Application in Legal Research, supra* note 80, at 1128 n.37.

literature are not equally important for indexing purposes and that for large collections some selection of important aspects should be made to minimize the number of irrelevant responses.

At the Documentation Center we use people, not machines, to select and record the important aspects of subject content which will serve as index tags for future retrieval. . . .

The second assumption is that in the physical sciences questions are not always asked in the same words as are contained in the literature which answers them. Therefore, for document retrieval purposes, the natural text would serve unreliably as its own index and must be normalized, that is modified to fit a given pattern.[98]

The program was initially developed for electronic searches of metallurgical literature[99] and was subsequently adapted to legal documents such as the sales portion of the Uniform Commercial Code.[100] Aside from the drawback of using an artificial language, searches under the system are very costly[101] compared to some other electronic retrieval systems.

F. Key Words In Combination Approach

The "key words in combination" approach is a method by which the full text of the source material is placed into the computer without any prior indexing or condensation. John Horty developed it at the Health Law Center of the University of Pittsburgh in order to overcome problems that he and his staff faced in doing legal research with statutes.[102]

In the Pittsburgh system, the full text of statute sections is entered into the computer via magnetic tape, with each section of the statute treated as a document and identified by a document number. The computer prepares a concordance of the entire document file, listing all the words alphabetically and noting beside each word the document numbers of each section where that word occurs. In addition to the document number, the location of the word in the original text is explicitly described by other numbers which pinpoint the sentence within the section where the word occurs and the position of the word within the sentence. While the machine is preparing the concordance, it also gathers data of considerable value in linguistic statistical studies and in the development of other programs.

98. Melton, *"The Semantic and Coded Abstract" Approach,* 62M M.U.L.L. 48, 49.
99. *Id.* at 49.
100. *Id.* at 52.
101. Hayden, *How Electronic Computers Work: A Lawyer Looks Inside the New Machines,* 62J M.U.L.L. 112, 115.
102. Loevinger, *supra* note 55, at 10.

> Searches are accomplished by the researcher himself. He selects words which he believes should appear in a statute touching upon his problem. He may be aided in this task by a list of the words actually used in the statutes or by a thesaurus. The thesaurus acts as a spur to the imagination leading the researcher from words he has thought of to other words which might also be used. In the Pittsburgh system any number of artful combinations of selected words may be employed.
>
> . . . .
>
> Once framed, these searching instructions are given to the computer along with additional instructions indicating that the searcher desires the document numbers, the full citations or a complete printout of the text of the relevant documents. As many as 500 terms can be searched simultaneously by the computer. This means that 50 different searches averaging ten terms per search could be accomplished at one pass of the tape.[103]

The alphabetical list of words initially created by the computer in this system left out some 112 so-called common words like "the," "a," "an," "therefore," "however," and "by," which had no intrinsic search purpose.[104] Concerning this "Common Word List" Horty has said, "this Common Word List was selected with no great care and will be varied and probably increased as experience dictates."[105]

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103. Eldridge & Dennis, *supra* note 75, at 87–88. In Horty, *The "Key Words in Combination" Approach*, 62M M.U.L.L. 54, 59–60, there is an example of how a search is made in his system:

> Searches are initially prepared on paper, with the searcher putting down single words, or words and their synonyms, which define the words or phrases he expects to find in the documents he considers relevant to his inquiry. Thus, if he wished to search for all the Pennsylvania statutes dealing with illegitimate children, he might put into one class, the words "baby," "child," "foundling," "infant," "juvenile," "minor," "orphan," etc., along with their various forms. Thus requiring that one of these words, at least, appear in a document for it to be considered relevant. Another class could be established containing the words "father," "mother," "parent," "unwed," "unmarried," "legitimate," etc.
>
> To specify to the machine the relationship which must exist between the words in context, a certain operator is utilized. One such operator is the word "or," which is used within each class above to tell the machine that either "baby," or "child," or "foundling," etc., must appear in the document for it to be considered relevant. When it is desired to tie two classes or two words together, the operators, D, S, or W may be used. If, as was done in the search above, it is desired that the statutory section contain at least one word from the first class of words and at least one word from the second, the operator D is used to indicate that at least one word in each class must appear in a relevant document. Similarly, if a tighter relationship is desired, the operator S would be used to indicate that representatives from each of the classes must appear in the same sentence.
>
> In a search involving illegitimate children, in addition to those documents containing representatives of the two classes stated above it may be desired that certain documents be considered relevant if a certain single word appeared therein, such as "illegitimate," "bastard," "parentage," "putative," etc. If the document containing the phrase "born out of wedlock" is sought, the operator "W plus 3 plus 3" is used. This operator requires that the word "wedlock" appear in the same sentence, no more than three words after "born."

104. Horty, *supra* note 103, at 58.

105. *Ibid.*

The hardware used for the operation has ranged from an IBM "650",[106] an IBM "7070",[107] an IBM "1401"[108] to an IBM "1410/1301" system.[109]

There are three output commands for the computer in the Horty program:

> After framing the structure of the search, it is possible to give the computer three output commands, using the words "list," "cite", and "print." The command "list" causes the numbers of the relevant documents to be printed. The command "cite" causes the program to print from the original text tape the citations of each document considered relevant. With respect to Pennsylvania statutes, a typical citation would be "Pennsylvania Statutes Annotated, Title 15, Section 21." Finally, the command "print" causes the relevant documents to be printed in their entirety.[110]

The Pittsburgh system has been referred to as the first electronic system "to bring to bear on legal research problems complete capabilities other than speed."[111] Up to now this system has concentrated on the retrieval of statutory material. An enumeration of the collection of statutes contained in the project's tape library was set out previously in this paper. Judge John R. Brown of the United States Circuit Court of Appeals for the Fifth Circuit has said that this project "demonstrates that multi-state statutory material is susceptible of data storage for effective and rapid retrieval in the course of research on specific pinpoint problems."[112]

In a test against a manual non-computer system, which involved six searches, this system's "searches produced more than twice as many references (177) deemed relevant by the researchers as the manual searches (72), and the manual searches produced a minimal number of references missed by the machine (2)."[113] However, searching for case law and searching for statutes are two entirely different things. Professor Dickerson has commented:

> One problem is that the volume of case law is overwhelmingly greater than that of statute law. Secondly, judicial opinions are written much more loosely and in a far more heterogeneous language. A vocabulary list for a large body of

106. *Id.* at 54.
107. *Id.* at 55.
108. *Ibid.*
109. *Law School Research Projects Reported,* 65S M.U.L.L. 117, 123.
110. Horty, *supra* note 103, at 60.
111. Eldridge & Dennis, *supra* note 75, at 88.
112. Brown, *Electronic Brains and the Legal Mind: Computing the Data Computer's Collision With Law,* 71 YALE L.J. 239, 252 (1961).
113. Loevinger, *Jurimetrics: The Methodology of Legal Inquiry,* 28 LAW & CONTEMP. PROB. 5, 13 (1963); Horty, *supra* note 103, at 60–61.

case law comparable to that developed for hospital statutes would approach the dimensions of a good-sized dictionary.[114]

Professor Horty has put some case law on tape. The Health Law Center tape library contains abstracts of all judicial decisions of the Pennsylvania Supreme Court and the Superior Court dating from 1790. These decisions are available for use by the Allegheny County Bar. Also available for search will be the full text of all judicial decisions of the United States Supreme Court and the United States Circuit Court of Appeals for the Third Circuit dating from 1950.[115]

G. The Root Term Approach

Professor Robert Wilson has undertaken experiments[116] with the Horty system as applied to reported cases dealing with arbitration in five southwestern states:

> Several refinements dictated by the nature of the material have been made on the Keyword-in-Combination system. The most important refinement provides for collecting all the various forms of a given word under a common 'root' term. Thus 'harm', 'harms', 'harming', 'harmed', and so on, would be assigned a single numerical code. All words occurring in the natural text of the selected cases are arranged alphabetically in a list with each word followed by the 'root index number' which identifies its basic common root. From this point on, searching . . . is accomplished by using the root index numbers instead of words. This means that in writing a search question one does not have to advert to all the possible suffixes which may appear in a document collection, since all such words will have a common root index number.
>
> The operational value of the root index file in the selection of search terms is considerable. A greater degree of compactness of the concordance is achieved, with a consequent reduction in search time. In order to minimize the pitfalls of subjective decisions about groupings, the task of subsuming words under single code numbers is performed by hand from a complete list of words occurring in the cases. The words are not looked at in context; only orthographical similarities are considered in the groupings.
>
> Experimentation has not developed to the point where it is possible to evaluate this refinement [of the Horty-Pittsburgh system]. . . . Further, the selection of arbitration cases will make evaluation very difficult. First, the subject matter has limited the

114. Dickerson, *Electronic Computers and the Practical Lawyer,* 14 J. LEGAL ED. 485, 496 (1962).

115. Interview with Professor John Horty, Director of the Health Law Center, University of Pittsburgh, March 3, 1966.

116. Eldridge & Dennis, *supra* note 75, at 89-90; Wilson, *Computer Retrieval of Case Law,* 16 SW. L.J. 409 (1962).

input to a very small number of cases. Second, the artificiality of a severely limited subject matter in the input materials means that a tremendous proportion of the sophisticated work which the computer must perform in a full-size operation has been accomplished by the simple expedient of elimination.[117]

H. The Joint ABF-IBM Approach

Since 1961 the American Bar Foundation and the International Business Machines Corporation have been engaged in a joint study of the "effective use of computer technology in the storage, indexing and retrieval of judicial decisions."[118] Mr. William B. Eldridge, the project's director, and his principal assistant, Mrs. Sally F. Dennis, Advisory Systems Engineer of IBM,[119] have given the following description of the project's purpose:

> [W]e are trying to design a system that combines the merits of non-classification with those of classification, in an "untouched-by-human-hand" precedure.
>
> The overall plan for the pilot experiment is to convert raw text to machine readable form, prepare a thesaurus (index-word space, or the "association map") automatically, using half the raw material, and to index the other half automatically with reference to index-word space in such a way that volumes of index-word space representing concepts will denote each document. The documents then will be stored in a modified inverted file, in which the heading is an expression of the concept volume rather than a keyword or descriptor, and then searching will take place in an obvious manner.[120]

For experimental purposes the project created a magnetic tape library of 5,000 cases chosen from volumes 158-181 of the Northeastern Reporter, second series. Included in these cases are opinions from the highest and intermediate courts of appeal in the states of Massachusetts, New York, Indiana, Ohio and Illinois.[121]

At the annual meeting of the American Bar Association's Special Committee on Electronic Data Retrieval in August 1965, Mrs. Dennis reported upon the progress of her project:

> The design, experimental implementation and laboratory testing of a computer system for automatic concept-indexing and

117. Eldridge & Dennis, *supra* note 75, at 90.
118. *American Bar Foundation to Study Automated Indexing of Court Decisions,* 63S M.U.L.L. 147.
119. Eldridge & Dennis, *Report of Status of the Joint American Bar Foundation — IBM Study of Electronic Methods Applied to Legal Information Retrieval,* 63M M.U.L.L. 27.
120. Eldridge & Dennis, *supra* note 75, at 95–96.
121. *American Bar Foundation Makes 5,000 Judicial Decisions Recorded on Computer Tape Available for Research,* 64S M.U.L.L. 86–87.

searching of expository text have been completed, using as an experimental library the ABF sample of 5000 decisions from the Northeastern Reporter. The system functions by referring to a "thesaurus" or vocabulary network, previously constructed automatically in the computer by examining word behavior in a sample of the text and fitting that behavior to a mathematical model. The search mechanism accepts English prose questions directly from the user and returns a ranked set of citations in less than a minute.

Performance tests were made during the research period and judged by William B. Eldridge, Project Director for the American Bar Foundation. They indicate that the system is about twice as reliable as straight word matching in retrieving complete sets of relevant cites for any given dilution with "false drops" and that it is fairly insensitive to different phrasings of the same question.[122]

At the same meeting Mr. Eldridge made these comments:

[T]he most serious difficulty in evaluating the operation of the system is the inadequacy of the basic file on which the experiments were conducted. While this file represented, at the time it was created, the largest sample of cases utilized in computer research, it is not adequate for a satisfactory test of the system. Five thousand decisions taken chronologically from the Northeastern Reporter just does not include enough subject matter to produce meaningful citations in answer to many of the questions which were submitted. Such manual searching as we have been able to do for comparison evaluation indicates that the failure to find pertinent citations is not a fault of the system but that precedent cases are not present in the sample. In retrospect, I would choose a different basis today for selecting the sample. I still believe we were correct to use a sample of cases not subjected for subject matter, but a richer basis probably could have been chosen without significantly increasing the cost of preparing the data base. For example, 5000 cases selected from ALR would have produced considerably meatier decisions and have expanded the range of subjects and problems covered considerably. Despite these difficulties, however, we can state that the experiments verify our hypothesis and that it seems likely that additional research will refine the system to the point of operational adequacy.[123]

I. The LITE Project

The "LITE" in this project's name stands for "Legal Information Through Electronics." Richard P. Davis, of the Air Force Account-

122. Dennis, *Status of American Bar Foundation Research on Automatic Indexing — Searching Computer System,* 65S M.U.L.L. 131–32.

123. Eldridge, *The American Bar Foundation Project,* 65S M.U.L.L. 129, 131.

ing and Finance Center, described this project's progress in this fashion:

> In 1962, the Air Force decided to develop a modern electronic information retrieval system for use in the fiscal legal field. . . .
>
> The LITE system can best be described as a full text information retrieval system. Each and every word of all of the text data bases in the system are stored on magnetic tape and available for machine processing and retrieval. At the present time, we have the capability to search and retrieve on the full text of all Titles of the United States Code, all published decisions of the Comptroller General of the United States and the Armed Services Procurement Regulations. We are currently adding to the system all unpublished decisions of the Comptroller General of the United States, International Law Material, as well as other regulatory material. By the end of June, 1966, we should have a data base of approximately 40 million words of text.[124]

This system makes use of the Key-word-in-context technique.[125]

J. Other Projects

In addition to the projects discussed thus far, there are a great many other projects being conducted in the field of automatic retrieval of legal information. These will be referred to in a general manner.

As can be seen from the review of the various projects, several agencies of the United States Government, such as the Air Force, the Department of Justice and the Federal Trade Commission, have played active roles in this area. Similar governmental projects for the electronic retrieval of case law are under way at the Federal Aviation Agency,[126] the Federal Communications Commission,[127] the Office of the Chief Counsel of the Internal Revenue Service[128] and the United States Patent Office.[129]

Law Research Service, Inc. a commercial service which offers computer-oriented research services to the Bar, has over one million abstracts of cases stored in its magnetic tape library, including all the New York cases officially reported since 1846 and all officially reported federal cases. After a search of this library is completed, a

124. Davis, *LITE: Legal Information Through Electronics,* 65S M.U.L.L. 138.
125. *Id.* at 139.
126. Interview with John C. Lyons of the Graduate School of Public Law, George Washington University, March 11, 1966.
127. *Ibid.*
128. Link, *RIRA — A Legal Information System in the Internal Revenue Service,* 43 TAXES 231 (1965).
129. Labudde, *Computers in Law Practice: Rise of Computer Use and Methods,* 25 MILWAUKEE B.A. 6, 8 (1964); Davis, *Automatic Data Processing and the Judge Advocate General's Corps,* 23 MILITARY L. REV. 117, 137 (1964).

requesting attorney receives a memorandum which contains: "(1) the full text printout of several of the most relevant cases; (2) citations of additional applicable cases, statutes and other authorities; (3) a discussion and analysis of the facts contained in the attorney's question; and (4) a discussion of the applicable law." The service claims that in its first year of full-time business operation it performed over 20,000 case searches for some 5,000 attorneys.[130]

In the years since 1952, when "the history of the computer commences in earnest,"[131] more and more university inspired projects have gone into operation in this field. Aside from the university projects already referred to, other projects have been launched at the law schools located at Boston University,[132] Denver University,[133] University of Florida,[134] George Washington University,[135] University of Iowa,[136] University of Oklahoma,[137] University of Pennsylvania,[138] and St. John's University.[139]

Another group expressing interest in the computer's potentiality for case law retrieval has been judges and persons affiliated with the states' highest appellate courts. Mr. Richard Dahl, Law Librarian for the State of Washington, informed the author that the Supreme Court of Washington is very interested in having the approximately 30,000 state judicial decisions put into computer retrievable form. In view of the fact that it would cost too much for the court to do this alone, Mr. Dahl has tried to interest the State Attorney General and the State Legislature in the project and a representative *ad hoc* committee has been formed to look into this situation and report.[140]

130. *Jurimetrics: The Electronic Digital Computer and Its Applications In Legal Research, supra* note 80, at 1131.

131. Eldridge & Dennis, *The Computer As A Tool for Legal Research,* 28 LAW & CONTEMP. PROB. 78, 83 (1963).

132. *Law School Research Projects Reported, supra* note 109, at 117.

133. Davis, *supra* note 129, at 136. The purpose of the Denver project is to create a data bank of all the cases in the field of oil and gas law, and make them available for research.

134. *Law School Research Projects Reported, supra note* 109, at 120.

135. *Ibid.* Professor Kayton's project is based on the use of digital computers. He claims to have developed "a system for largely automatically generating a synonym dictionary for use in the automatic retrieval of case law." His synonym dictionary generator has generated a thesaurus "in the field of automobile litigation from a small body of case law."

136. *Jurimetrics: The Electronic Digital Computer and Its Application in Legal Research, supra* note 80, at 1120 (1965). Professor Vestal is using a computer in his study "of the practices of various publishers in printing the opinions of federal district court judges and the opinion-writing practices of such judges."

137. *IBM 1410 Used for Cataloging Oklahoma Space Law Collection,* 62D M.U.L.L. 241. The work here centers upon "the adoption of the Key Word in Context (KWIC) program for cataloging the Space Law Collection maintained in the Law Library."

138. *Law School Research Projects Reported, supra* note 109, at 121–22.

139. *Id.* at 119. Professors Burger and Rohan are "working on a survey of condemnation practice for the Nassau County (New York) Attorney."

140. Interview with Richard Dahl, Law Librarian of the Supreme Court, State of Washington, March 9, 1966.

In New York James M. Flavin, the Official State Reporter for the Court of Appeals, is trying to develop a feasible electronic system for case law retrieval and is experimenting with the cases contained in the first volume of the second series of the New York Reports.[141] An interesting project called "Project Lawsearch," which involves "a non-electronic approach to law searching,"[142] has been undergoing experimentation for the past several years:

> Project Lawsearch grew out of the strong conviction that a search system for the law incorporating new developments in information handling, yet capable of individual use by attorneys themselves, would be of immediate, practical benefit to the bar.
>
> Project Lawsearch has evolved such a system. It is non-electronic, manually operated and designed for an office desk or a library table. It is intended to complement, not compete with, computer systems as a search tool for the law. . . .
>
> Project Lawsearch is being carried out in three phases. The first phase — the indexing of legal materials in the field of motor carrier law — has been undertaken by a law publishing group consisting of the Michie Company, Charlottesville, Virginia; The Bureau of National Affairs, Inc., Washington, D.C.; and Matthew Bender and Company, Inc., New York, N. Y. The second phase — development of equipment — has been the responsibility of Jonker Business Machines, Inc., Gaithersburg, Maryland. The third and final phase — the evaluation of the results — rests with the American Association of Law Libraries.[143]

The project is now in its third phase.[144]

K. Other Activity

Since 1954 the American Bar Association has had a special Committee on Electronic Data Retrieval.[145] Beginning in 1959 this Committee has published in cooperation with Yale University a quarterly periodical devoted to electronic data processing called M.U.L.L. — *Modern Uses of Logic in Law.*[146]

The American Bar Association has published for the last few years "a yearly volume affectionately known as the 'Little Green Book.'" Its official name is the *Index to Legal Theses and Research*

141. Interview with James M. Flavin, State Reporter, New York Court of Appeals, March 3, 1966.
142. Thomas, *Project Lawsearch, A Non-Electronic Approach to Law Searching,* 63M M.U.L.L. 49.
143. *Id.* at 50.
144. Marke, *Progress Report on Project Lawsearch,* 58 L. LIBRARY J. 18 (1965).
145. Allen, *Automation: Substitute and Supplement in Legal Practice,* 7 Am. Behavioral Scientist, Dec. 1963, p. 39.
146. *Ibid.*; see also Hiller, *Comes the Revolution,* 51 A.B.A.J. 257 (1965).

Projects and it uses the "KWIC" (Keyword-in-Context) method and is photo-offset printed from the computer printout.[147] In 1961 the American Law Student Association formed a "techno-legal committee to collect, collate and disseminate information relating to the impact of technology upon law and lawyers."[148] The Philadelphia Bar Association created a Committee on Electronic Information Processing and the Law in 1961.[149] The Dallas Bar Association created a similar committee in 1962[150] and the Boston Bar Association started one in 1963.[151]

At this time the President of the United States has under consideration a proposal to create a National Law Library System, which would make use of electronic methods of information retrieval. It is envisioned that the library would contain all the decisions of the federal courts, decisions of the states' highest courts, federal regulations, opinions of federal agencies, legal periodicals, and all other legal literature.[152]

The purpose of this section has been to discuss the many activities going on in the legal community aimed at making the automatic search for case law as natural for lawyers to use as today's methods of search. There is little doubt that ultimately the legal profession will have at its disposal a workable system of automatic case law retrieval that will only print out relevant, pertinent citations. When this happens several obvious benefits immediately come to mind:

1. A lawyer will no longer find himself in the terrible situation of the lawyer in the famous cartoon in the *New Yorker Magazine*. In that cartoon the lawyer is pictured with his partner; both are working late at night burning the midnight oil; they are in their library surrounded by thousands of books; and finally the lawyer says to his partner: "But I know there is a case somewhere!"[153]
2. Lawyers at all economic levels of the Bar will be equally armed with the law.[154]
3. The storage problem created by constantly multiplying legal materials would be largely solved.[155]

147. Eldridge & Dennis, *supra* note 119, at 28.
148. *Law Students Lawtomate,* 62J M.U.L.L. 104.
149. *Philadelphia Committee on Electronic Information Processing and the Law,* 62M M.U.L.L. 34.
150. *EDR Committee of Dallas Bar Association Meets,* 62D M.U.L.L. 242.
151. Committee on Automation Formed in Boston, 63J M.U.L.L. 84.
152. Interview with Julius J. Marke, Professor of Law and Librarian, New York University School of Law, March 21, 1966.
153. JONES, LAW AND ELECTRONICS: THE CHALLENGE OF A NEW ERA 68 (1962).
154. Morgan, *"The Point of Law" Approach,* 62M M.U.L.L. 44, 47–48.
155. Loevinger, *Science and Legal Thinking,* 25 FED. B.J. 153, 162–63 (1965).

Computers are expensive machines; therefore it is doubtful that many lawyers or law offices will be able to afford them.[156] However, Judge Loevinger has predicted:

> It is now commonplace to transmit data directly from one electronic computing machine to another by telephone cable. When (and I do not say if) adequate facilities for electronic data storage and retrieval are developed for legal use, it is foreseeable that there need be only a few such facilities in relatively large areas. Private law offices may well be equipped with coding and decoding machines that are little larger or more complex than an electric typewriter, and which can be connected directly to a telephone line. In order to utilize the data stores in an electronic computer at some central location it will then be necessary only for the law office to call the central research facility, much as the library might be called by telephone today, and to have the office coding machine attached directly to the central computer by way of the telephone cable. In this manner a lawyer in any part of the country might undertake a direct research project in any law center equipped with the appropriate electronic equipment.[157]

In areas of public activity other than the law, there is already a nationwide movement to create state computer centers that will be able to service more than one government agency at a time.[158] A conference such as the one sponsored by the Graduate School of Public Administration of New York University on the subject, "The Large-Scale Public E.D.P. System: Its Problems and Prospects," which was held in New York City on April 1 and 2, 1966 serves to point up this development. At the present time twenty-three states have some form of computer center in operation.[159] One such center is located in New York State[160] and serves more than thirty different state agencies.[161]

> The Central Computer service evolved as a result of an indicated trend to install small individual single purpose computers

156. Lawlor, *What Computers Can Do: Analysis and Prediction of Judicial Decisions,* 49 A.B.A.J. 337 (1963).

157. Loevinger, *Jurimetrics: Science and Prediction in the Field of Law,* 46 MINN. L. REV. 255, 270–71 (1961); Furth, *Some Foreseeable Developments In Computer Technology That Are Relevant to The Legal Profession,* in COMMUNICATION SCIENCES AND LAW: REFLECTIONS FROM THE JURIMETRICS CONFERENCE 291–92 (Allen & Caldwell ed. 1965); Laning, *Forces and Trends in State and Local Government EDP,* 25 PUBLIC AD. REV. 151, 154 (1965).

158. THE COUNCIL OF STATE GOVERNMENTS, SUMMARY 1965 ANNUAL MEETING WESTERN CONFERENCE OF THE COUNCIL OF STATE GOVERNMENTS 15–16.

159. THE COUNCIL OF STATE GOVERNMENTS AND PUBLIC ADMINISTRATION SERVICE, AUTOMATED DATA PROCESSING IN STATE GOVERNMENT 8, table 3 (1965).

160. *Id.* at 5, 8.

161. Interview with Thomas W. O'Connor, Director, Division of Data Processing, Executive Department, New York State, February 28, 1966; interview with Dennis G. Price, Director, State Computer Systems Development, Division of the Budget, New York State, February 24, 1966.

> in many State agencies. It was believed that a central organization installed to provide a complete computer service would offer an efficient, economical method of achieving the same objectives. The equipment ordered, with its special features, was designed to meet the data processing requirements of all the agencies who participate in the Central Computer service.[162]

However, the development of a completely computerized system of legal research for judges and lawyers may not be an unmixed blessing. Professor Hans W. Baade of Duke University stated:

> [E]ven in seemingly as neutral an area as information storage and retrieval, an "open" system — i.e., a system of total storage and complete search — might well result in a major readjustment of substantive law as presently applied. This applies particularly to those legal subjects which, like the conflict of laws, have for some reason or other not been satisfactorily covered in a systematic manner by presently available indexing procedures. Here, and in fields primarily regulated by substantially unlitigated and poorly codified or compiled statutes, a total search might well produce sources of indisputable authority which would unsettle (or, if a different jurisprudential analysis is preferred, correct) what theretofore were assumed to be firmly established rules of law.[163]

Dean Eugene V. Rostow of Yale University has warned:

> Obviously, a machine utilizing photography and rapid printing . . . can produce lists of relevant cases, articles and statutes far more rapidly than our painfully pawing through the West indices or Shepard's. I put aside for a moment the problems of classification. The first question I want to raise is simply whether . . . we really want to possess the full remembrance of things past. If a machine gives us a comprehensive list, for example, of all the cases and all the statutes and all the times in which the word "partnership" has been used in the legal literature, we should be simply swamped. It would be quite impossible to do our work and quite impossible ever to solve any problems at all. In other words, forgetting is almost as important as retrieval. We have to find devices for forgetting, and we have to adapt our lives to that fact, perhaps more rapidly than ever before. This is a painful thought for those who are trained, as I was, to enjoy writing an article or a book that I regard as craftsmanlike beyond any other professional pleasure. Who on earth will have time to read it?[164]

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162. THE COUNCIL OF STATE GOVERNMENTS AND PUBLIC ADMINISTRATION SERVICE, *op. cit. supra* note 159, at 8.

163. Baade, *"Forward" to Jurimetrics Symposium*, 28 LAW & CONTEMP. PROB. 1, 2 (1963).

164. Rostow, Panel Discussion, *The Computer in Law, Yes or No?*, 64S M.U.L.L. 93, 102.

III. THE WORK BEING DONE TO DETERMINE HOW JUDICIAL DECISIONS ARE ACTUALLY MADE

The second section discussed the efforts under way to evolve a workable computer-oriented procedure to retrieve judicial decisions after they have been made. This section will discuss the efforts under way to evolve a workable computer-oriented procedure to determine how judicial decisions are made. The main emphasis of the work in the area of computers and judicial decision making has been on the development of a feasible way to research judicial decisions, rather than on the development of additional insight into how judicial decisions are made.

The work thus far, on the subject of computers and how judicial decisions are made, has focused upon the development of programs that will permit the computer to accurately predict judicial decisions. The theory behind this approach is that for computers to accurately forecast the outcome of judicial decisions their programming has to be based on a complete knowledge of the ingredients that go into making the judicial decision. Professor Irving Kayton of the George Washington University Law School has said:

> The use of computers as a tool for investigating the judicial process is in an embryonic stage. The techniques developed thus far are primitive compared to those used in nonlegal fields to which computers have been applied. If they are ever so improved that computer prediction in law becomes more accurate more regularly than *ad hoc* human prediction, our significant accomplishment will not be that we have created a mechanical servant to take over human effort. Rather it will be that we have succeeded in discovering and isolating more of those factors which are the viscera of the judicial decision-making process than we could have without the rigorous analysis forced upon us by the logical demands of the computer.[165]

The principal work in the field of predicting judicial decisions by computer has been done by Reed C. Lawlor, a patent attorney,[166] and by Glendon Schubert[167] and Fred Kort,[168] political scientists. In 1965, Lawlor gave this progress report on his work:

> The methods which I have developed assume among other things that judges are logically consistent and that this logic can

165. Kayton, *Can Jurimetrics Be of Value to Jurisprudence?*, 33 GEO. WASH. L. REV. 287, 314 (1964).
166. Lawlor *supra* note 156, at 339.
167. Schubert, *Judicial Attitudes and Voting Behavior: The 1961 Term of the United States Supreme Court*, 28 LAW & CONTEMP. PROB. 100 (1963).
168. Kort, *Simultaneous Equations and Boolean Algebra in the Analysis of Judicial Decisions*, 28 LAW & CONTEMP. PROB. 143 (1963).

be expressed as Boolian functions of the facts. The logic is not the simple syllogistic logic of Aristotle that was condemned by Holmes and Pound. It is the logic of compound statements of the propositional calculus combined with my theory of personal stare decisis. For the most part, I utilize a threshold logic. Underlying all of this is the assumption that the decision of a judge is a function of the facts and that the decisional behavior of each judge can be expressed by his personal equation.

The personal equation . . . reflects his knowledge, his experience, his education, his bias, and even his view of public policy. The equations are designed to describe what he will do when presented with a new set of facts, not why he will do it. The problems of developing equations are compounded because all these factors are changing all the time and the changes are often invisible. It is assumed that these equations can be relied upon to a large degree, even if these factors are hidden from view. The methods are also applicable to a multiple-judge court as a whole, so long as the judges act as if they are fungible, even though they are not.

The question is not whether these assumptions are always true, but solely: how well does the method work?

At the time that I prepared the prediction of *Gideon v. Wainwright,* I made use of prediction equations that had been derived manually, by the use of edge-notched cards. This was a tedius task which required approximately 150 hours of my time. Though I could do it in less time now, this is a task which no one would want to perform twice. Accordingly, in September, 1962, I began to work on theories and programs for automating this analysis. This goal was achieved in 1963, and has been further extended in numerous ways since that time. In my methods I analyze, not just a case or two, but a large set of cases that are concerned with a single issue. The methods involve a study of the composite or mass effect of the fact patterns of an entire set of cases on a single issue and the voting patterns of the judges on those cases. I proceed on the assumption that computers can detect relations between fact patterns that are imperceptible to men. . . .[169]

He has used an IBM "7090"[170] computer in this work. Recently the National Science Foundation[171] awarded him a grant in the amount of $71,800 for a two-year period,[172] in order that he would be able to continue his work on a broader scale.[173]

169. Lawlor, *Analysis and Prediction of Judicial Decisions — Informal Progress Report,* 65S M.U.L.L. 132–33.
170. *Id.* at 132.
171. *Simulation of Judicial Decision Making,* 65S M.U.L.L. 124–25.
172. *Simulation of Judicial Decision Making, supra* note 171.
173. Lawlor, *supra* note 169, at 132.

In order to develop sounder methods of predicting the outcome of judicial decisions, Schubert[174] and Kort[175] have used computers[176] in the studies that they have each made of individual United States Supreme Court Justices and their opinions.[177] They have applied their respective methods of computer analysis to the prediction of the outcome of *Gideon v. Wainwright,*[178] the landmark right to counsel case. Schubert described the results as follows:

> Kort states . . . that the Boolian algebraic predictor equation method "could not have predicted the overruling of *Betts v. Brady* — the case in which the Supreme Court [first] had stated the rule that the decisions of the state right to counsel cases depend on the combinations of certain relevant and controlling facts." Lawlor . . . agrees that the prediction for what turned out, in fact, to be the overruling case *(Gideon v. Wainwright)* would have been incorrect if the Boolian method described by Kort — which Lawlor associates with the model of traditional *stare decisis* — had been used. When, however, the Boolian method was refined to take into consideration the previous voting behavior in regard to the right to counsel value of the justices who participated in *Gideon v. Wainwright,* the prediction of the outcome was correct. In short the overruling of *Betts v. Brady* could be and was in fact predicted — and by Lawlor, not his computer — once the use of the Boolian method no longer was focused exclusively upon the outcome of earlier decisions, most of whose makers were either dead or retired by 1963. Instead, Lawlor used as the empirical data for his Boolian equations the voting records of the judges who were to be decision-makers in *Gideon v. Wainwright,* and his correct prediction of the outcome of that decision was based upon the measurement of their attitudes — for what is personal *stare decisis* but a lawyer's way of talking about what a social psychologist would call the consistency of highly structured individual attitudes?[179]

It may be concluded from the foregoing examination that the utilization of computers to determine how judicial decisions are made "is in an embryonic stage."[180] However, we can expect that as soon as a feasible method of automatic retrieval of judicial decisions is achieved, the full energies now being expended in that direction will be shifted

174. Schubert, *supra* note 167.
175. Kort, *supra* note 168.
176. SCHUBERT, THE JUDICIAL MIND 69 (1965); Schubert, *The 1960 Term of the Supreme Court: A Psychological Analysis,* 56 AM. POL. SCI. REV. 90, 95 (1962); Kort, *Content Analysis of Judicial Opinions and Rules of Law,* in JUDICIAL DECISION MAKING 133 (Schubert ed. 1963).
177. *Ibid.*
178. 372 U.S. 335 (1963).
179. SCHUBERT, JUDICIAL BEHAVIOR: A READER IN THEORY AND RESEARCH 455 (1964).
180. Kayton, *supra* note 165.

into this direction. The time is now ripe for the entire Bench and Bar to take a searching look at both the computer and the judicial decision making process in order that an opinion can be formulated by them as to the potential effect that the computer may have on the nature of how judicial decisions are made. The formulation of such an opinion by the legal profession at this time, even though a feasible computer program has not yet been achieved,[181] would be of inestimable value to the persons working in this area, since it would serve them as a guidepost upon which to orient their work.

This paper will only initiate this dialogue by discussing a few of the considerations that must be looked into before a thoughtful opinion can be rendered.

In order to come to an opinion as to whether the computer's effect on the judicial decision making process will be good or bad or even indifferent, the words "the judicial decision making process" must be defined. If the judicial decision making process is defined as nothing more than a judge applying rational principles to the facts of a case to reach a logical decision,[182] then there should be little argument to the view that a properly programmed computer could perform that task as efficiently or more efficiently than the judge. This view is based upon the fact that the computer very effectively performs logical operations.[183] To program the computer to render logical decisions it merely would be necessary to logically define rational principles for the computer program, and then the computer mechanism would apply them on command to the facts of each case.

The advantages of having the computer make the logical decision instead of the judge include: "the infinite storage potential"[184] of the

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181. *Headliners: An Interview with John Diebold,* N.Y. Herald Tribune, Mar. 20, 1966, (This Week Magazine) p. 2. In this article Mr. Diebold, an automation pioneer, said in answer to the following question:

> Q—"Will there be anything machines can't do?"
> A—"Human beings possess imagination, free will, and purposefulness. Thus far no machine has developed these abilities. But five years ago we thought machines could not learn. Then we watched them learn to beat champions at checkers — simultaneously learning the rules of the game and the rules of winning."

See JONES, *op. cit. supra* note 153, at 238. Lawlor is quoted as predicting, on page 238 of the aforesaid book:

> The day should come, when it will come I don't know, but the day should come, when you will be able to feed a set of facts to a machine that has cases, rules of law, and reasoning rules stored in it, and in which the machine can then lay out for you, step by step, the reasoning process by which you may be able to arrive at a conclusion. You can then study it and then decide whether the machine is right or wrong. In some cases the machine may not tell you exactly what the conclusion may be, but may say there is a probability that such-and-such is correct, and this probability is 90%.

182. Cowan, *Decision Theory in Law, Science and Technology,* 17 RUTGERS L. REV. 499, 508 (1963).

183. *Id.* at 511.

184. *Ibid.*

computer memory which makes it less likely that the computer would overlook a rational principle; computers "are obedient, and they have detachment"[185] which means that they are not affected by such things as emotions and prejudices in reaching a logical decision. In addition, the computer has as much flexibility[186] as the judge in making a logical decision. The computer derives its flexibility from the fact that "a computer program can be changed without getting a new computer."[187] Therefore, should it be desired to change the rational principles, one need only logically define the new rational principles in another computer program and then substitute it for the old one.

In fact, even though a judicial decision of reversal has been called "a logical inconsistency,"[188] a computer could be programmed to render one. This could be accomplished by logically programming the computer to ignore a line of rational principles under certain pre-set conditions. The computer would then create and apply, pursuant to the program, a new rational principle to the facts of the case before it. In this instance the computer printout could be programmed to announce that the old line of rational principles has been reversed and replaced by a new rational principle.[189]

Judicial decision making that simply applies rational principles of law to facts in order to reach logical decisions has been referred to by some persons as mechanical jurisprudence.[190] If we define the judicial decision making process as containing "something more" than just the application of rational principles to facts in order to reach a logical decision regardless of its social value, then we must utilize a different standard to measure the potential effect that the computer would have on the decision making process. Dean Rostow spelled out one meaning of this "something more" in a lecture he delivered at the University of Colorado in 1961:

> [T]he prevailing American philosophy of law — the largely unstated code by which in fact we live, as lawyers and as citizens —

185. Adams, *Comments on Implications of Computer Technology for Law Teachers and Lawyers in the Next Decade,* in COMMUNICATION SCIENCES AND LAW: REFLECTIONS FROM THE JURIMETRICS CONFERENCE 286 (Allen & Caldwell ed. 1965).
186. *Ibid.*
187. *Ibid.*
188. Kayton, *supra* note 165, at 312. In this connection, it is worthwhile to mention this poem, quoted by Labudde, *Computers in Law Practice: Rise of the Computer Use and Methods,* 25 MILWAUKEE B.A. 6, 10 (1964):

> This is the tale of the 1401,
> The law clerk that was nobody's son.
> It spent its days in a furious hunt
> For authorities, dictum and argument,
> But after it found them, it burned with shame;
> The Supreme Court reversed it just the same.

189. Lawlor, *Automation in Law,* 40 CAL. B.J. 30, 31 (1965).
190. Pound, *Mechanical Jurisprudence,* 8 COLUM. L. REV. 605 (1908).

> prescribes a standard of high social responsibility for lawyers as judges, advocates, counsellors, legislators, and law professors. That standard is implicit in the view, which I believe is now rightly dominant in our culture, that law is not, in Blackstone's phrase, a "rule of civil conduct, prescribed by the supreme power in a state, commanding what is right and prohibiting what is wrong," but rather a system of social order, an accepted procedure for making certain social decisions. Inescapably, the procedure of law must utilize general propositions and sets of propositions, the so-called "rules of law." Pound has described this "scientific element" in the law functionally as "a reasoned body of principles for the administration of justice . . . a means towards the end of law, which is the administration of justice. . . ."[191]

Embodied in the definition of the judicial decision making process as a "means toward an end" is the concept that:

> [T]he decision need no longer be consistent (a logical demand) with the set of rational principles that furnish the body of existing law. Social necessity may dictate a change however irrational the change might appear in the light of existing rational principles of law. Not the rational principles of the mind but the wholly non-rational demands and interests of society. . . .[192]

In actual fact the "means toward an end" approach leads to a decision maker that "is more interested in the effects of the decision than in its form. . . ."[193]

When we characterize the judicial decision making process as a "means toward an end" instead of just as a judicial "slot machine";[194] we move from the safe beach of "conformity to reason, uniformity, and certainty"[195] to an ocean of uncertainty and uncomfortableness.[196] It is far more difficult to conceptualize for computer programming the meaning of the judicial decision making process as a "means toward an end," than it is to conceptualize for computer programming the meaning of "mechanical jurisprudence." The difficulty of conceptualization in the former case is due in no small part to the fact that there is no universally accepted theory as to what actually happens when judicial decision making operates as a "means toward an end."

Professor Thomas A. Cowan, a knowledgeable student of the judicial decision making process, has said: "[L]aw is scientifically

191. Rostow, *American Legal Realism and the Sense of the Profession*, 34 ROCKY MT. L. REV. 123, 124 (1962).
192. Cowan, *supra* note 182, at 508.
193. *Id.* at 509.
194. Dickerson, *Some Jurisprudential Implications of Electronic Data Processing*, 28 LAW & CONTEMP. PROB. 53, 54 (1963).
195. Pound, *supra* note 190, at 605.
196. CARDOZO, THE NATURE OF THE JUDICIAL PROCESS 166–67 (1921).

ignorant of its own workings, knows nothing of how it brings about its results, is unable to predict its effects. . . ."[197]

Llewellyn quotes William James as having said, "for the most part the completed decision wipes off memory's slate most of the process of its attainment."[198] Judge Hutcheson claims that the judicial decision maker is motivated by "hunches";[199] Felix Cohen claims that the judicial decision maker is motivated by "some standard of human values";[200] Pound claims that the judicial decision maker is motivated by a "trained intuition"[201] which "continually leads him to

197. Cowan, *Some Problems Common to Jurisprudence and Technology,* 33 GEO. WASH. L. REV. 3, 4 (1964).

198. LLEWELLYN, THE COMMON LAW TRADITION: DECIDING APPEALS (1960) at 104 citing 1 JAMES, PRINCIPLES OF PSYCHOLOGY 260 (1890).

199. Hutcheson, *The Judgment Intuitive: The Function of the "Hunch" In Judicial Decision,* 14 CORNELL L.Q. 274, 287–88 (1929). In this article Judge Hutcheson said:

> All of us have known judges who can make the soundest judgments and write the dullest opinions on them; whose decisions were hardly ever affirmed for the reasons which they gave. Their difficulty was that while they had the flash, the intuitive power of judgment, they could not show it forth. While they could by an intuitive flash leap to a conclusion, just as an inventor can leap to his invention, just as often as an inventor cannot explain the result or fully understand it, so cannot and do not they.
>
> There is not one among us but knows that while too often cases must be decided without that "feeling" which is the triumphant precursor of the just judgment, that just as "sometimes a light surprises the Christian while he sings," so sometimes, after long travail and struggle of the mind, there does come to the dullest of us, flooding the brain with the vigorous blood of decision, the hunch that there is, or is not invention; that there is or is not, anticipation; that the plaintiff should be protected by a decree, or should be denied protection. This hunch, sweeping aside hesitancy and doubt, takes the judge vigorously on to his decision; and yet, the cause decided, the way thither, which was the blinding moment a blazing trail, becomes wholly lost to view. . . .
>
> It is such judicial intuitions, and the opinions lighted and warmed by the feeling which produces them, that not only give justice in the cause, but like a great white way, make plain in the wilderness the way of the Lord for judicial feet to follow.

200. Cohen, *Transcendental Nonsense and the Functional Approach,* 35 COLUM. L. REV. 809, 847 (1935). Cohen wrote:

> It is perhaps the chief service of the functional approach that in cleansing legal rules, concepts, and institutions of the compulsive flavors of legal logic or metaphysics, room is made for conscious ethical criticism of law. In traditional jurisprudence, criticism, where it exists, is found masked in the protective camouflage of transcendental nonsense: "the law *must* (or *cannot*) be thus and so, because the *nature* of contracts, corporations or contingent remainders so requires." The functional approach permits ethics to come out of hiding. When we recognize that legal rules are simply formulae describing uniformities of judicial decision, that legal concepts likewise are patterns or functions of judicial decisions, that decisions themselves are not products of logical parthenogenesis born of pre-existing legal principles but are social events with social causes and consequences, then we are ready for the serious business of appraising law and legal institutions in terms of some standard of human values.

201. Pound, *The Theory of Judicial Decision,* 36 HARV. L. REV. 940, 951 (1923). He stated:

> However repugnant to our nineteenth century notions it may be to think of anything anywhere in the judicial administration of justice as proceeding otherwise than on rule and logic, we cannot conceal from ourselves that in at least three respects the trained intuition of the judge does play an important role in the judicial process. One is in the selection of grounds of decision — in finding the legal materials that may be made both to furnish a legal ground of decision and to achieve justice in the concrete case. It is an everyday experience of those who study judicial decisions that the results are usually sound, whether the reasoning from the results purport to flow is sound or not. The trained intuition of the

right results for which he is puzzled to give unimpeachable legal reasons."[202]

Despite the elusive nature of the concepts embodied in the definition of the judicial decision making process as a "means toward an end," the computer could be programmed to consider these concepts, if we logically predetermine "what end society desires to reach" and "when society desires to reach this end." The problem of developing such a computer program lies in deciding: (1) who is to be given the responsibility to determine what the end is that society desires to reach?; and (2) who is to be given the responsibility to determine when society desires to reach that end?

Under present judicial decision making machinery it is within the judge's discretion to decide the end that society desires to reach, and then the specific case supplies the "when." It is in response to the specific case that the judicial decision maker may see fit to enunciate new legal principles "as the means toward the end" sought to be accomplished by society.

The importance of specific cases to the judicial decision making process is summed up in a statement by the late Judge Charles Clark: "[A]djudication, unlike philosophizing, always and primarily concerns and affects specific persons actually before the court; only in a subordinate and secondary way does it deal with or proclaim abstract principles."[203] Holmes, in his dissent in *Lochner v. New York,* put it another way: "General propositions do not decide concrete cases. The decision will depend on a judgment or intuition more subtle than any articulate major premise."[204] The apparently unfettered power of the judge to decide what end society is striving toward, impelled Judge Henry J. Friendly of the United States Court of Appeals for the Second Circuit to comment that: "[T]he new judge soon learns that each judge judges differently from every other judge and that any one judge judges differently in each case."[205]

The computer, like most scientific instruments, handles general propositions more efficiently than specific instances.[206] However, whether the definition of the judicial decision making process is that

judge continually leads him to right results for which he is puzzled to give unimpeachable legal reasons. Another place where the judge's intuition comes into play is in the development of the grounds of decision, or interpretation. This is especially marked where it becomes necessary to apply the criterion of the intrinsic merit of the possible interpretations. A third is in application of the developed grounds of decision to the facts.

202. *Ibid.*

203. Clark, *The Limits of Judicial Objectivity,* 12 AM. U.L. REV. 1, 2 (1963).

204. 198 U.S. 45, 76 (1905).

205. Friendly, *Reactions of a Lawyer — Newly Become Judge,* 71 YALE L.J. 218, 229 (1961).

206. Cowan, *supra* note 182, at 499-502.

of "a means toward an end" or that of "mechanical jurisprudence," the outcome of most judicial decisions is predictable. Cardozo,[207] Llewellyn[208] and Charles Clark[209] have commented on this fact.

The significance of this predictability lies in the fact that because of the routine nature of these cases they virtually decide themselves with little or no help from the judge — "decision maker"; therefore, as to these cases, the computer could undoubtedly be programmed to decide them. However, when we turn our attention to the small remaining group of cases that do not lend themselves to routine treatment we become uncertain as to the computer's ability to adequately dispose of them. Our reservation about the computer's ability to dispose of these particular cases finds its basis in the fact that "the creative element in the judicial process"[210] is called into play to decide them. Cardozo has said:

> Finally there remains a percentage, not large indeed, and yet not so small as to be negligible, where a decision one way or the other, will count for the future, will advance or retard, sometimes much, sometimes little, the development of the law. These are the cases where the creative element in the judicial process finds its opportunity and power. . . . In a sense it is true of many of them that they might be decided either way. By that I mean that reasons plausible and fairly persuasive might be found for one conclusion as for another. Here come into play that balancing of judgment, that testing and sorting of considerations of analogy and logic and utility and fairness, which I have been trying to describe. Here it is that the judge assumes the function of a lawgiver.[211]

The only way to program "the creative element in the judicial process" into the computer is to logically define what it means. If this is done, one could properly pose this question: How can it still be "the creative element in the judicial process," when it has already been programmed prior to its use? A synonym for the "creative element in the judicial process" is "judicial legislation." Holmes defined judicial legislation:

> [T]he growth of the law is legislative. And this in a deeper sense than that what the courts declare to have always been the law

207. CARDOZO, *op. cit. supra* note 196, at 164; CARDOZO, THE GROWTH OF THE LAW 60 (1924). In The Growth of the Law, Cardozo gave an estimate as to the number of cases that fall into this category: "Nine-tenths, perhaps more, of the cases that come before a court are predetermined — predetermined in the sense that they are predestined — their fate preestablished by inevitable laws that follow them from birth to death."

208. LLEWELLYN, *op. cit. supra* note 198, at 4.

209. Clark & Trubek, *The Creative Role of the Judge: Restraint and Freedom in the Common Law Tradition*, 71 YALE L.J. 255, 256 n.7 (1961).

210. CARDOZO, *op. cit. supra* note 196, at 165.

211. *Id.* at 165–66.

> is in fact new. It is legislative in its grounds. The very considerations which judges most rarely mention, and always with an apology, are the secret root from which the law draws all the juices of life. I mean, of course, considerations of what is expedient for the community concerned. Every important principle which is developed by litigation is in fact and at bottom the result of more or less definitely understood views of public policy; most generally, to be sure, under our practice and traditions, the unconscious result of instinctive preferences and inarticulate convictions, but none the less traceable to views of public policy in the last analysis. And as the law is administered by able and experienced men, who know too much to sacrifice good sense to a syllogism. . . .[212]

Exactly as Holmes wrote, judges are reluctant to disclose that their decisions are "legislating" new law. For this reason judges prefer to be known as "declarers" of the law rather than as "makers" of the law.[213] Charles Clark called this judicial "law making" power "judicial freedom."[214] This "judicial freedom" has always challenged those persons who desire greater certainty in the law, but there can never be complete certainty in the law as long as judges have the "freedom" to "make" or "legislate" new law.

Over a hundred years ago the quest for certainty in the law reached its zenith with mechanical jurisprudence,[215] to which the reaction of the legal realists was "sharp and explosive."[216] The legal realists[217] sought "an awareness of the relationship between rules and policy, viewing law as an instrument for social action in a society constantly in flux. . . ."[218] In the last few years a new fervent desire for certainty in the law has brought Llewellyn,[219] Wechsler,[220] Griswold[221] and other legal thinkers to "embrace unquestioningly a faith in legal objectivity."[222] Lasswell warned of the dangers of such a trend to the concept of creativity in the judicial decision making process when he said, "running through much of the modern work that is being done on the decision process is the desire to abolish discretion on the part of the chooser and to substitute an automatic machine-like routine."[223]

212. HOLMES, THE COMMON LAW 35–36 (1881).
213. Hamilton, *The Judicial Process,* 8 ENCYC. SOC. SCI. 450, 454 (1932).
214. Clark & Trubek, *supra* note 209, at 256.
215. Rostow, *supra* note 191, at 126–27.
216. *Id.* at 127.
217. Clark & Trubek, *supra* note 209, at 267.
218. Rostow, *supra* note 191, at 131.
219. Clark & Trubek, *supra* note 209, at 276.
220. Wechsler, *Toward Neutral Principles of Constitutional Law,* 73 HARV. L. REV. 1 (1959).
221. Griswold, *Forward: Of Time and Attitudes — Professor Hart and Judge Arnold,* 74 HARV. L. REV. 81 (1960).
222. Clark & Trubek, *supra* note 209, at 276.
223. Lasswell, *Current Studies of the Decision Process: Automation Versus Creativity,* 8 WESTERN POLITICAL Q. 381, 387 (1955).

The very nature of the computer makes it a natural ally of this new "quest for certainty,"[224] and, in line with the new school's philosophy, it brings complete "objectivity" to the judicial decision making process. In a detached,[225] unemotional[226] way, the computer renders rational decisions based upon logical analysis.[227]

Regardless of which school of jurisprudence one belongs to — whether that of complete certainty in judicial decision making or that of judicial freedom in judicial decision making — there are some areas in which the computer offers potential aid to every type of judicial decision maker. The computer will someday furnish the judicial decision maker with:

(1) complete "access to repositories of all laws, rulings, regulations, and procedures, and the commentaries upon them."[228]

(2) complete speedy[229] "step by step"[230] analysis of alternative approaches to the problem to be solved together with the probabilities of the correctness of each one of the approaches.[231]

(3) complete simulation of "large scale social interactions"[232] that will permit the decision maker, before he makes his decision, to know the effect that each of the alternative decisions he could make would have upon "desired or detested human behavior."[233]

Obviously a judge would be able to make a sounder decision if he had this storehouse of information available to him, even if "in-

224. Clark & Trubek, *supra* note 209, at 267.
225. Adams, *supra* note 185, at 286.
226. *Ibid.*
227. Cowan, *supra* note 182, at 511.
228. Stover, *Technology and Law — A Look Ahead,* 63M M.U.L.L. 1, 3.
229. FRANK, COURTS ON TRIAL 206 (1950).
230. JONES, LAW AND ELECTRONICS: THE CHALLENGE OF A NEW ERA 238 (1962).
231. Mayo & Jones, *Legal-Policy Decision Process: Alternative Thinking and the Predictive Function,* 33 GEO. WASH. L. REV. 318, 325 (1964).
232. Cowan, *Decision Theory In Law, Science and Technology,* 17 RUTGERS L. REV. 499, 515 (1963).
233. Rosenberg, *Quantitative Methods for Judges, Lawyers and Law Teachers,* in COMMUNICATION SCIENCES AND LAW: REFLECTIONS FROM THE JURIMETRICS CONFERENCE 172 (Allen & Caldwell ed. 1965); Stover, *supra* note 228, at 3. Stover wrote:

> The future legal practitioner might also be supported by electronic information systems that will supply vast amounts of current data about the practices of the society in which the law operates. Even the computer processing of the statistical data now available in the reports of state, national, and international agencies, statistical abstracts, almanacs, and encyclopedias — a development that appears quite feasible using available techniques — would be a giant step forward. The existence of such a system could be expected to encourage and facilitate the collection and collation of additional data now judged too difficult to handle. Joined with prodigious developments in the social sciences, such a facility would foster and simplify the preparation of "Brandeis Briefs" and give lawyers, judges and legislators a much better picture of the society in which they are working.

tuition" played a role in the decision making process. It has been said that "intuition never suffers from having facts to work with. . . ."[234] Charles Clark has stated:

> [A] judge should possess *knowledge;* and so far as he lacks that, he should go out to see that he obtains it. Knowledge, as I use it, is made intentionally an all-inclusive word. It will necessarily mean many things: complete understanding of the actual case and its growth and development and the parties before the court; familiarity with the background elements, including for so many of our cases the history of our government and the economic and political background of the debated issues; and an understanding of other wisdoms and disciplines, even — spare the word for the vehemence it has aroused — psychology.[235]

A danger posed by the complete computer storehouse of information and analysis is the possible intellectual corruption of the weak judge. This type of judge may be all too eager to abdicate his decision making responsibility in the difficult cases to the machine in order to "avoid the necessity of facing the consequences of his own decisions."[236] Thus:

> The legal profession must consider whether the amount of refinement in legal technique promised by electronic systems is desirable. At a rudimentary level, it is possible that too much information could result, jamming the process of legal reasoning even worse than it is at present. Too much awareness of the limitations of current practice may precipitate urgent and unwise technical reforms. It may often be better not to know how bad things are. Too much perfection in technical support, far from freeing the mind of the jurist for "the higher questions" as some claim, may enslave him to routinized formulas. Even at present, far too many scholars, lawyers, and judges pursue the easy course of formalistic legal thinking instead of seeking fresh insights and deeper understanding. The effect of improved electronic systems may be to qualify the mediocre and discourage the great.[237]

On the other hand, the strong judge could use this additional information and analysis for the purpose of gaining more insight into the problem, and not for the purpose of shifting his decision making responsibility to the machine.[238]

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234. Mayo & Jones, *supra* note 231, at 376–77 n.187 citing Michaels, *A Strategy for Innovation,* Bull. of Atomic Scientists, Apr. 1964, pp. 19–20.
235. Clark, *supra* note 203, at 11.
236. Clark & Trubek, *supra* note 209, at 271.
237. Stover, *supra* note 228, at 4–5.
238. Lasswell, *supra* note 223, at 396–97. Lasswell said here:
[W]hen the experimental emphasis shifts toward "procedures" the problem is to discover the effect of various techniques of clarifying preferences, estimating the

This section has highlighted a few of the factors that must be considered by the Bench and the Bar in arriving at their opinion on the computer's potential role in judicial decision making. Two eminent members of the legal profession have already rendered preliminary opinions on the relationship that law should have toward the computer and allied scientific developments. Frederick Bernays Wiener has written:

> The case for computer prediction has been most strongly put by a distinguished patent lawyer [Lawlor] and an eminent political scientist [Kort].
>
> [S]peaking as a litigating lawyer having some acquaintance with legal history, I am compelled to the view that their arguments ignore not only the course and nature of the judicial process but the nature of law as well. Even in the field of case and statute data retrieval, the user of the machine is still at the mercy of the original indexer's fallibilities, besides which a few hours of personal digging in the digests will give him the feel and the flavor of the decisions in a way that no machine possibly can.
>
> In short, members of the Bar will be well advised to stay very far away from computers if they want to remain — or become — lawyers rather than simply attorneys at law. Computers are fine for inertial guidance problems — but the law is neither a missile nor an atomic submarine.[239]

Judge Loevinger has stated:

> [T]here will always be assumptions and choices to be made by the free spirit of a man, and no scientific operation or test can ever properly make or constrain such choices. Fears for the dangers of a "mechanized jurisprudence" are both quixotic and uncomprehending. Jurimetrics is not concerned with a debate as to whether the metaphorical life of the law has been logic or experience. Jurimetrics is concerned only with investigating the structure and dimensions of all experience that is relevant to the law.[240]

It has been said that "the law is not a series of calculating machines where definitions and answers come tumbling out when the right levers are pushed."[241] There are no "easy substitutes, however ab-

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future, inventing policy alternatives, and performing the other component activities within the decision-making arena. And the aim is not to impose the relationships that have prevailed in the past upon the decision-makers of the future, but rather to bring to their notice a body of pertinent intelligence capable of enhancing the understanding and insight with which they approach the contextual consideration of future problems.

239. Wiener, *Decision Prediction by Computers: Nonsense Cubed — and Worse,* 48 A.B.A.J. 1023, 1028 (1962).

240. Loevinger, *Jurimetrics: The Methodology of Legal Inquiry,* 28 LAW & CONTEMP. PROB. 5, 35 (1963).

241. Douglas, *The Dissent: A Safeguard of Democracy,* 32 J. AM. JUD. SOC'Y 104, 105 (1948).

stractly labeled, for the intellectual labor of acquiring knowledge and using it. There is no automation or I.B.M. to provide answers, and the judge must know that and act on his own and all alone."[242] In the final analysis it is the legal profession and society that will determine what the judicial decision making process will be like in the world of tomorrow.

IV. CONCLUSION

This paper has pointed out in two areas — that of decision retrieval and decision making — the effects that the computer revolution has had thus far on the law. In the next decade these effects will increase a hundred or even a thousandfold.

In order to properly react to the computer revolution the legal profession will have to abandon its traditional resistance to technological change. It has been said that "it was 1860 before they [lawyers] allowed steel pens to replace quills. Rubber bands were not used even as late as 1870. Telephones caught on slowly. There was even some reluctance to adopt typewriters."[243] It would be well for judicial educational programs like the Appellate Judges Seminars sponsored by the Institute of Judicial Administration and the Trial Judges Seminars sponsored by the National College of State Trial Judges to devote some part of their curriculum to the study of the computer and its relevance to judicial work.

Bernard Botein, Presiding Justice of the Appellate Division, First Department of the New York Supreme Court, set forth in a lecture delivered at the Association of the Bar of the City of New York what the Bar's attitude toward change should be: "Change is the raw data of progress. Change does not, however, become progress without the intervention of intelligence. And where change is revolutionary by reason of its speed and magnitude, anticipation is the only alternative to chaos."[244]

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242. Clark, *supra* note 203, at 12.

243. Dickerson, *Electronic Computers and the Practical Lawyer,* 14 J. LEGAL ED. 485, 487 (1962).

244. Botein, *The Future of the Judicial Process: Challenge and Response,* the nineteenth Annual Benjamin N. Cardozo Lecture to the N.Y.C.B.A. on February 25, 1960, at 25.